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Plate 12 Missing

DUVERNEY, Joseph Guichard [1648-1730]

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A
TREATISE
OF THE
Organ of Hearing:

CONTAINING

The STRUCTURE, the USES,

AND

The DISEASES of all the Parts
of the EAR.

Tranſlated from the *French* of the late
MONSIEUR *DU VERNEY*,
Of the Royal Academy of SCIENCES,
Counſellor Phyſician in Ordinary to the
late King of *France*,
And Profeſſor of *Anatomy* and *Surgery* in the
ROYAL PHYSICK-GARDEN at *Paris*.

Adorn'd with Sixteen Curious Copper-Plates.

LONDON:
Printed for SAMUEL BAKER, at the *Angel* and *Crown*
in *Ruſſel-Street*, *Covent-Garden*. MDCCXXXVII.

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Mr. Freke
Mr. Phillips } Surgeons to St. *Bartholomew's* Hoſpital.
Mr. Bigg

Gentlemen,

WHATEVER tends to the Benefit of Mankind in general, has no need of an Apology to introduce it to the World; and the more exenſive the Benefit is, the more valuable the Work muſt be. Now as there is no Art or Science but what in ſome manner conduces to this End, ſo that particularly which frees us from Pain and Sickneſs, muſt certainly be of the moſt univerſal Advantage, and conſequently merit the greateſt Encouragement. Anatomy and Surgery are of this kind; the one may be ſaid to be the Theory, the other the Practice, which like two neighbour Stars mutually reflect Light upon each other. The Knowledge therefore of our own Bodies, and an inquiſitive Search into the Organs of our Senſes, is not (as ſome idly imagine) a Matter meerly of Curioſity and Speculation. 'Tis this Knowledge, Gentlemen, which has ſo particularly diſtinguiſh'd you, and plac'd you in the Rank of the moſt Eminent in the Profeſſion. I might here, like moſt Dedicators, though with infinitely more Truth and Juſtice, enlarge abundantly upon your great Abilities, and other ſhining Virtues which ſerve to dignify your Characters; but that there is no need of a Pen to teſtify what is ſo loudly proclaim'd by the Tongues of Thouſands of poor Wretches, who owe their Lives as well as their Eaſe to that Skilfulneſs, Care and Humanity, the happy Influence of which they daily experience, and which I my ſelf am frequently an Eye-Witneſs of. 'Tis upon this account, Gentlemen, and not upon any Preſumption of my own Merit, that I am embolden'd to prefix your Names to this Tranſlation; not only as a means of recommending it to the World, but as an acknowledgment of that Reſpect and Duty, which I ſhall always retain a grateful Senſe of, and particularly of the many Favours and Obligations which are continually conferr'd upon me, by my worthy Maſter Mr. *Phillips*.

Nothing need be ſaid in praiſe of the Author, this Treatiſe has gain'd him ſufficient Applauſe from the moſt accurate Anatomiſts: But as for this Tranſlation (which I have endeavour'd to render as literal as poſſible) I ſubmit it entirely ly to your candid Judgments, hoping you'll excuſe thoſe Errors that may have eſcap'd me: And beg leave to ſubſcribe my ſelf,

Gentlemen,

Your Oblig'd

Humble Servant,

JOHN MARSHALL.

THE

AUTHOR's *Advertiſement.*

OF all the Organs aſſign'd to the Uſe of Animals, we have the leaſt Knowledge of thoſe of the Senſes; but there is none more obſcure than that of Hearing: the Minuteneſs and Delicacy of the Parts which compoſe it, being inclos'd by other Parts, (which by reaſon of their Hardneſs, are ſcarcely penetrable) render the Enquiries into them more difficult, and their Structure ſomething ſo intricate, that there is as much Trouble in explaining, as there was in diſcovering them. It is eaſy to judge how little known they were to the Ancients, by what they have wrote upon this Head: And amongſt the Moderns, Mr. *Perrault*, who in his *Phyſical Eſſays* has treated it with more Exactneſs and Perſpicuity than any one yet, nevertheleſs has omitted many things on this Subject, applying himſelf to thoſe particular Parts which ſerve for the better Explanation of the Nature of Sound, by the Organs of that Senſe of which it is the Object. And this is what has induced me to write upon this Matter.

Altho' I don't pretend that this Work is entirely perfect, yet I am in hopes there may ſomething more be found in it, at leaſt, than hath been deſcrib'd before; for I have endeavour'd (by all the neceſſary Precautions I cou'd take, to avoid the Obſcurity which is to be met with in moſt Authors, that I have read upon this Subject,) not only to give an exact and compleat Deſcription of all the Parts belonging to the

Ear, but alſo to make that Deſcription as plain and intelligible, as much as poſſible: To attain which, I have ſpar'd no Pains, but have ſearch'd with all the Care and Patience imaginable, into the moſt minute Parts, examining their Subſtance, and their Figure, with a continual Apprehenſion of forgetting ſome Things, or miſtaking one for the other.

For to make this Treatiſe more intelligible, I have been very careful and exact in the Figures, which are particularly neceſſary to render theſe ſort of Deſcriptions neat: And becauſe it is not enough that theſe Figures ſhould be true and faithfully delineated, if they were not beſides order'd and diſpos'd in ſuch a manner, that they may leave no room for Ambiguity; I have repreſented the Parts of the right Ear always in their natural Situation, to preſerve the firſt Ideas that they imprint upon the Mind, that they may not be confus'd nor deſtroy'd by one another. And becauſe it often happens, that in ſeeing the ſame Parts in various Views, we miſtake them for different Parts; I have left certain remarkable Parts, which are eaſily known again, ſuch as the *Proceſſus Zygomaticus*, *Mammillaris*, and *Styloides*, and the bony Paſſage of the Ear, to ſerve as an Index to the Reader, and which will be his ſureſt Guide in his Enquiry into the Part which he examines. In ſhort, that I might not omit any thing which I thought belong'd to the Subject which I treated of, I have added the Deſcription of the Ear of a *Fœtus* to that of the Ear of an *Adult*, wherein I have taken notice of all the Difference I ever met with between the one and the other.

As for the uſe of ſome Parts of this Organ, I muſt confeſs that every thing that I have ſaid of them does not entirely ſatisfy me, no more than what others have wrote upon this Subject; I don't equally aſſert the Truth of thoſe particular Things which were diſcover'd before me: As for thoſe I have found out my ſelf, they are things which I maintain to be true, which I have many times experienc'd upon a great Number of Subjects, and which I promiſe to demonſtrate plainly to all thoſe who ſhall have the Curioſity to inform themſelves.

As I have reſolv'd to give a Deſcription of all the Organs of Senſe, and ſince it is abſolutely neceſſary to determine what is the Origin of their Nerves; I have been obliged to make a new Plate of the Baſis of the Brain, not being able to make uſe of any of the Figures that have hitherto appear'd, not even thoſe of Mr. *Willis.* I have ſaid nothing of the Senſes, nor of Senſation in general, becauſe I thought it neceſſary to know firſt the Structure of their Organs. I ſhall defer ſpeaking of them, till I have finiſh'd a particular Deſcription of all the Senſes, and in the Interim I ſhall give you their anatomical Uſe.

I finiſh this Volume with a little Treatiſe of the Diſtempers of the Ear and their Cure, which muſt be look upon as an Eſſay, I ſhall endeavour to perfect it by the different Obſervation, which I may have an opportunity of making.

ERRATA.

Pag. 22. Line 6. for Plate IX. Fig. 11. read Plate IX. Fig. 1. Pag. id. Line 15. for *Feneſtræ* read *Feneſtra*. Pag. 26. Line 6. after *ſide*, read *next to the Aqueduct*. Pag. 27. Lin. 12. for *Incus* read *Stapes*. Pag. 32. Lin. 10. for *dedcrib'd* read *deſcrib'd*. Pag. 41. Lin. 12. for *there* read *theſe*. Pag. 54. Lin. 5. after *no* read *other*. Pag. 57. Lin. the laſt, for *upper* read *under*. Pag. 61. Lin. 6. after *fix'd* add *in Adults*. Pag. 62. Lin. 4. for *Inferior* read *Superior*. Pag. 106. Lin. 2. for *Yolk* read *Oil*. Pag. 109. Lin. 15. after *Ears* read *as alſo the Blood which comes out of 'em from Wounds in the Head*. Pag. idem. Lin 27. after *Blood* read *which are at the* Baſis *of the* Cranium. Pag. 110. for *I do find*, read *I don't find*. Pag. 118. Lin. 7. after *conſiſts in* read *Extracting*. Pag. 139. Lin. 27. after *Particles* read *mov'd*.

OF THE ORGAN OF HEARING.

PART I.

Containing the Structure of the Organ *of* Hearing.

The External Part of the Organ of Hearing, called only the Ear.

THE Ear itſelf without being diſſected is divided into two Parts, that which appears externally from the Head, and is properly called the Ear; and that which is ſunk into the Head, and is call'd the Hole of the Ear, or the Auditory Paſſage.

Is compos'd

The Ear is form'd of a pretty thic Cartilage, which is cover'd with a thi tender Skin, ſtor'd, eſpecially in youn Subjects, with a little Fat; under which i found another Nervous Covering, whic ſtrictly adheres to all the Cartilage.

Of a Cartilage,

This Cartilage commonly conſiſts o many Foldings, which are continued an terminate in a Cavity call'd the *Concha*, from its Reſemblance to the Entrance of a Snail-ſhell. The Winding or Folds of this Cartilage are more diſtinct in Adults, and their Figure is often varied. Beſides the Skin, the Cartilage, th Nervous Membrane, and the Fat, th Ear is furniſhed with ſome Muſcles, an adorn'd with Arteries, Veins, and Nerves

Of Skin, of Fat, of a nervous Membrane,

Of two Muſcles.

It has two Muſcles, the firſt conſiſts o fleſhy Fibres, which are fix'd to tha part of the Skull which the *Muſculus Temporalis* covers; they deſcend in a ſtrai Line, and are inſerted into the ſuperior Part of the ſecond Fold of the Ear: The ſecond is alſo compoſed of five or ſix fleſhy Fibres, which take their Origin from the ſuperior and anterior Part of the *Proceſſus Mammillaris*, they deſcend obliquely about the Length of an Inch, and are inſerted into the Middle of the *Concha*. See *Plate* I. *Fig*. I. and II.

Expla-

to Face page 3

Plate I.

Fig. I.

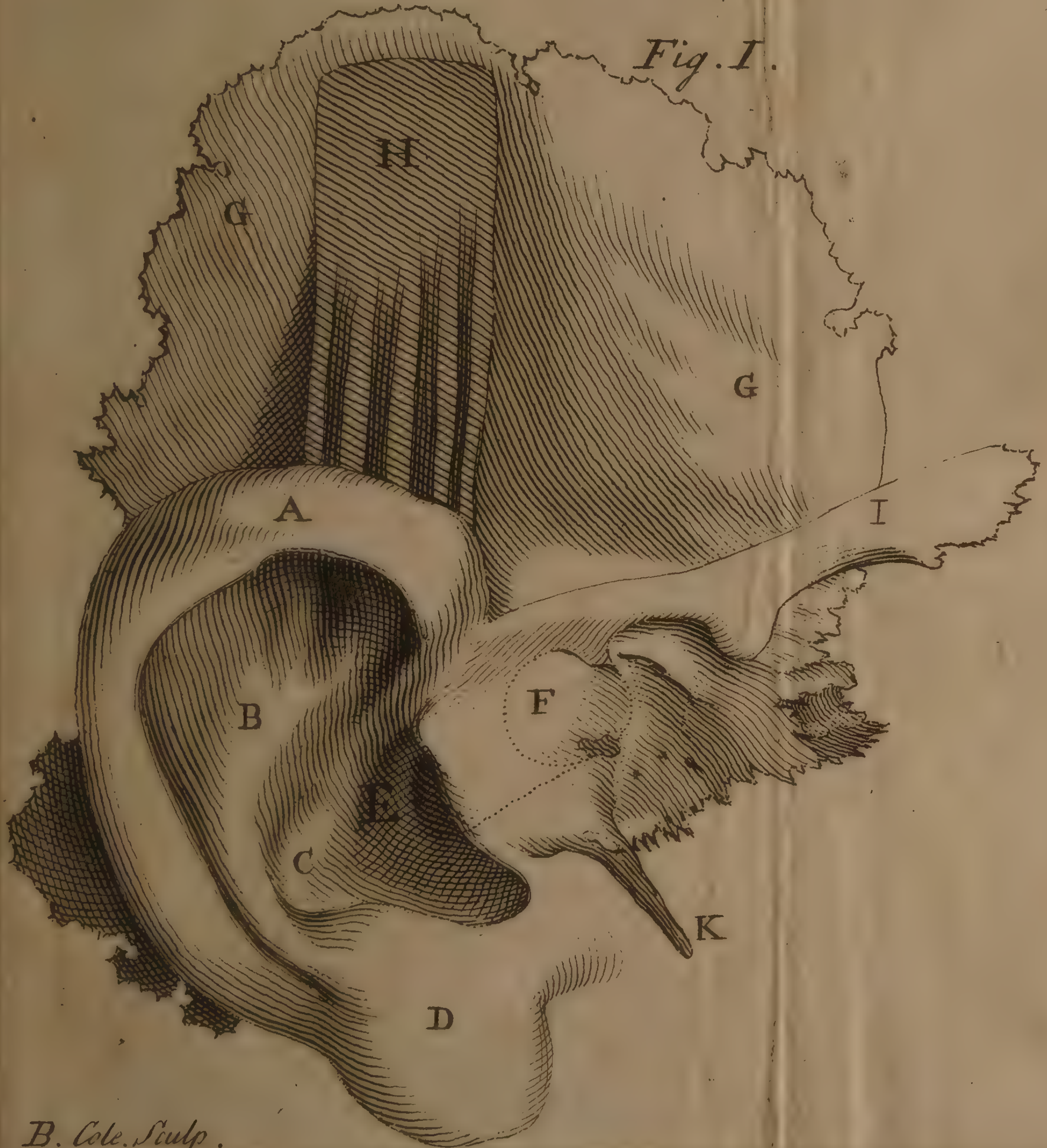
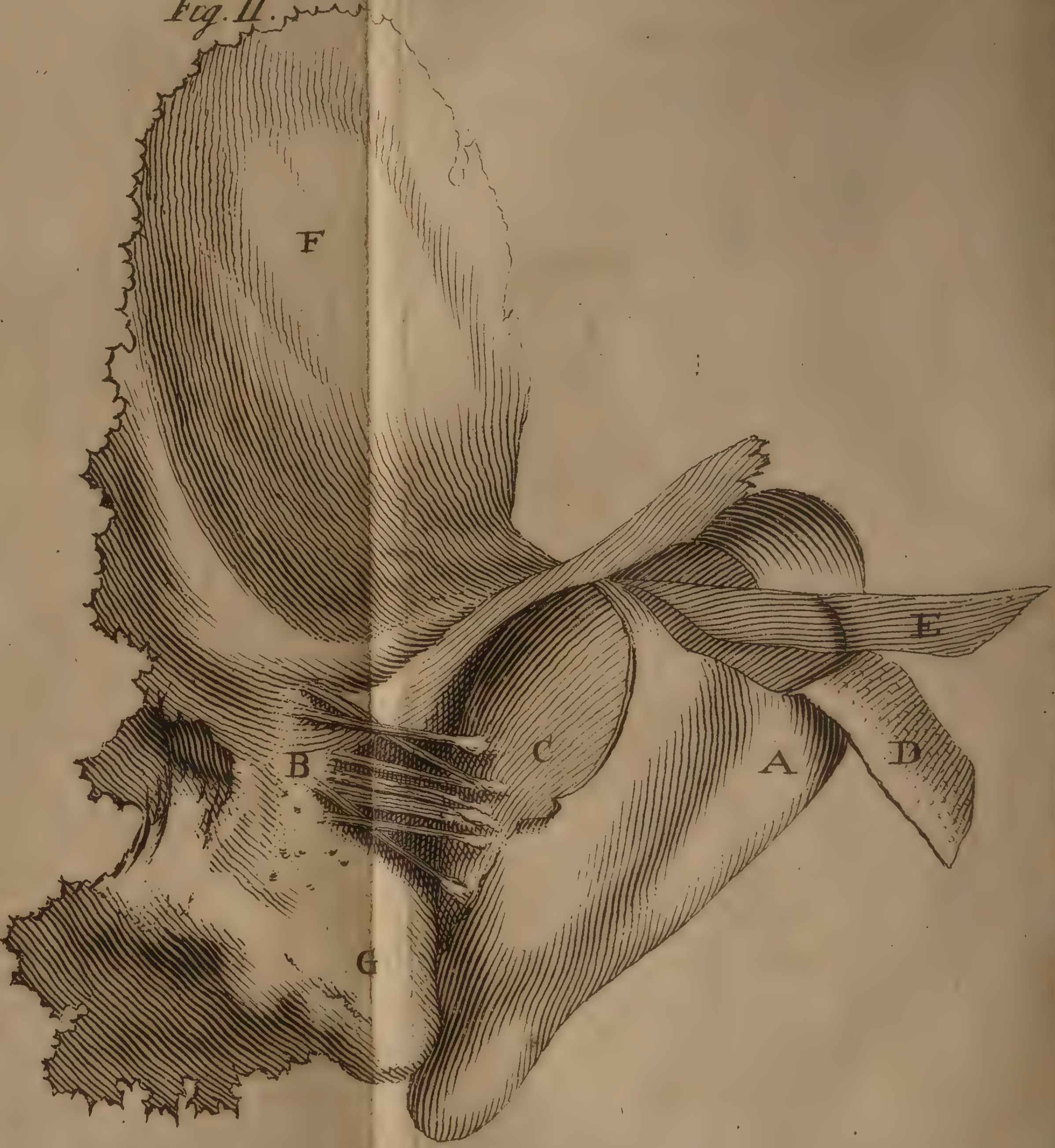


Fig. II.



B. Cole. Sculp.

Explanation of Plate I.

Fig. I. *repreſents the Ear in its natural Situation.* A B C D, *the Ear.* A B C, *its three Folds.* D, *the End of the Ear.* E, *the* Concha, *near* E *the Orifice of the Auditory Paſſage is ſeen.* F, *the Scituation of the* Tympanum. *The two dotted Lines ſhew the Length of the Paſſage.* G G, *the ſcaly Part of the Temporal Bone ſhewn bare.* H, *the firſt Muſcle, which is here repreſented as lying upon the ſcaly Part of the* Os Temporale, *becauſe it is diveſted of the Temporal Muſcle, upon which the Muſcle belonging to the Ear is naturally ſcituated.* I, *the* Proceſſus Zygomaticus. K, *the* Proceſſus Styloides.

Fig. II. *repreſents the Ear revers'd, to ſhew its ſecond Muſcle and its Integuments.* A, *the Ear revers'd.* B, *the ſecond Muſcle of the Ear, whoſe Fibres have been diveſted of their Membranes, to render their Origins and Inſertions the more diſtinct.* C, *the Place where the ſecond Muſcle is inſerted, ſtript of the Skin.* D, *the Skin of the Ear, ſtor'd in the lower Part with a little Fat.* E, *the Nervous Membrane.* F, *the Scaly Part.* G, *the* Proceſſus Mammillaris.

Of Arteries. The Arteries are Branches of the external Carotid, which after part of them being diſtributed to the *Larynx*, and to many Parts of the Face, are divided near the Articulation of the *Maxilla* into two other Branches; one of which paſſes over the fore-part of the Ear, and the other over the back-part. That Branch which paſſes behind the Ear, ſends off many little Ramifications, and is diſpers'd all over the back Part of the Ear: One of the moſt conſiderable of theſe Ramifications enters the Ear near the Auditory Paſſage, and is afterwards diſtributed into a great Number of ſmall Branches, which are expanded over the Skin, which lines the Inſide of the *Concha*.

That Branch which paſſes over the fore-part of the Ear, is that which is perceiv'd to beat at the Temples, and which is commonly open'd for great Pains in the Head. In paſſing it is divided into many leſſer Branches, which ſprinkle the Cartilaginous Paſſage; and continuing its Courſe, it is again ramified, and ſends forth in this place Branches, which are ſpread over the fore-part and back-part of the Ear.

Plate .II.

to Face page .5

Fig. I.

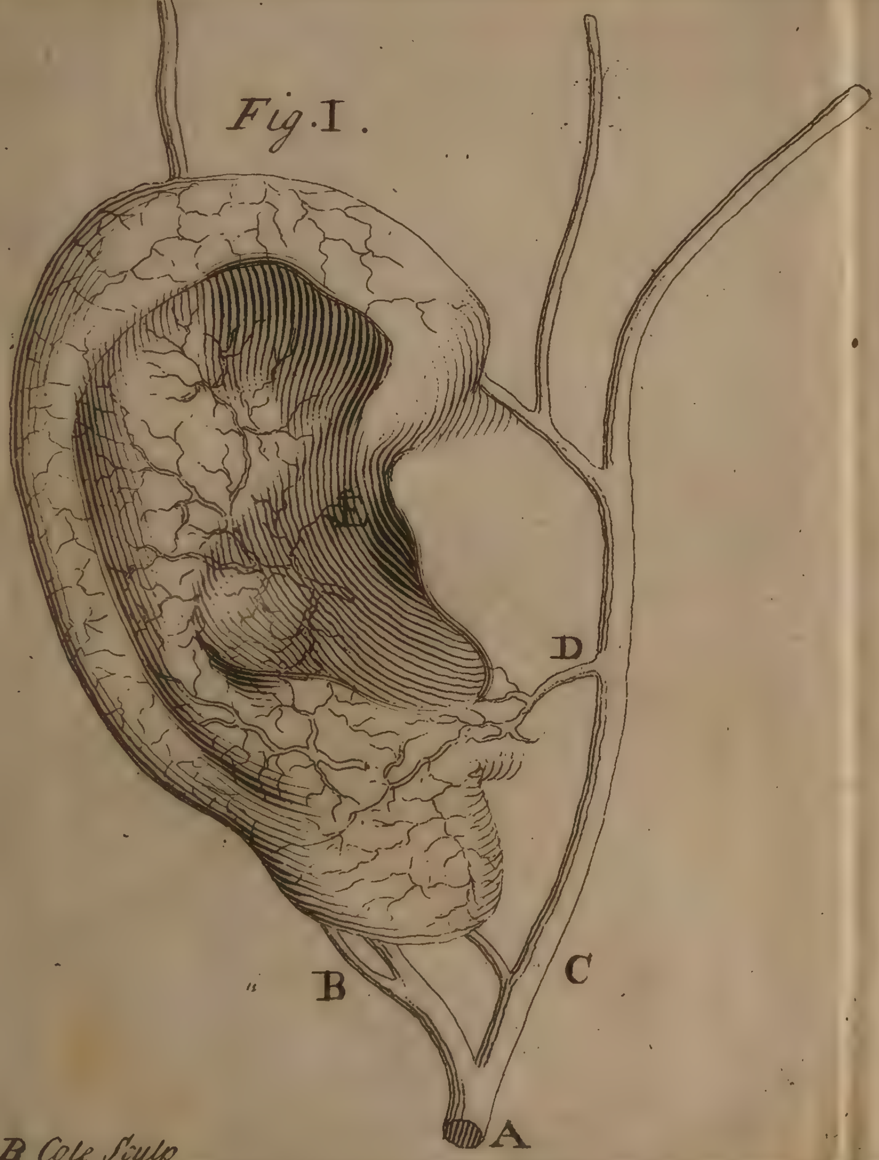
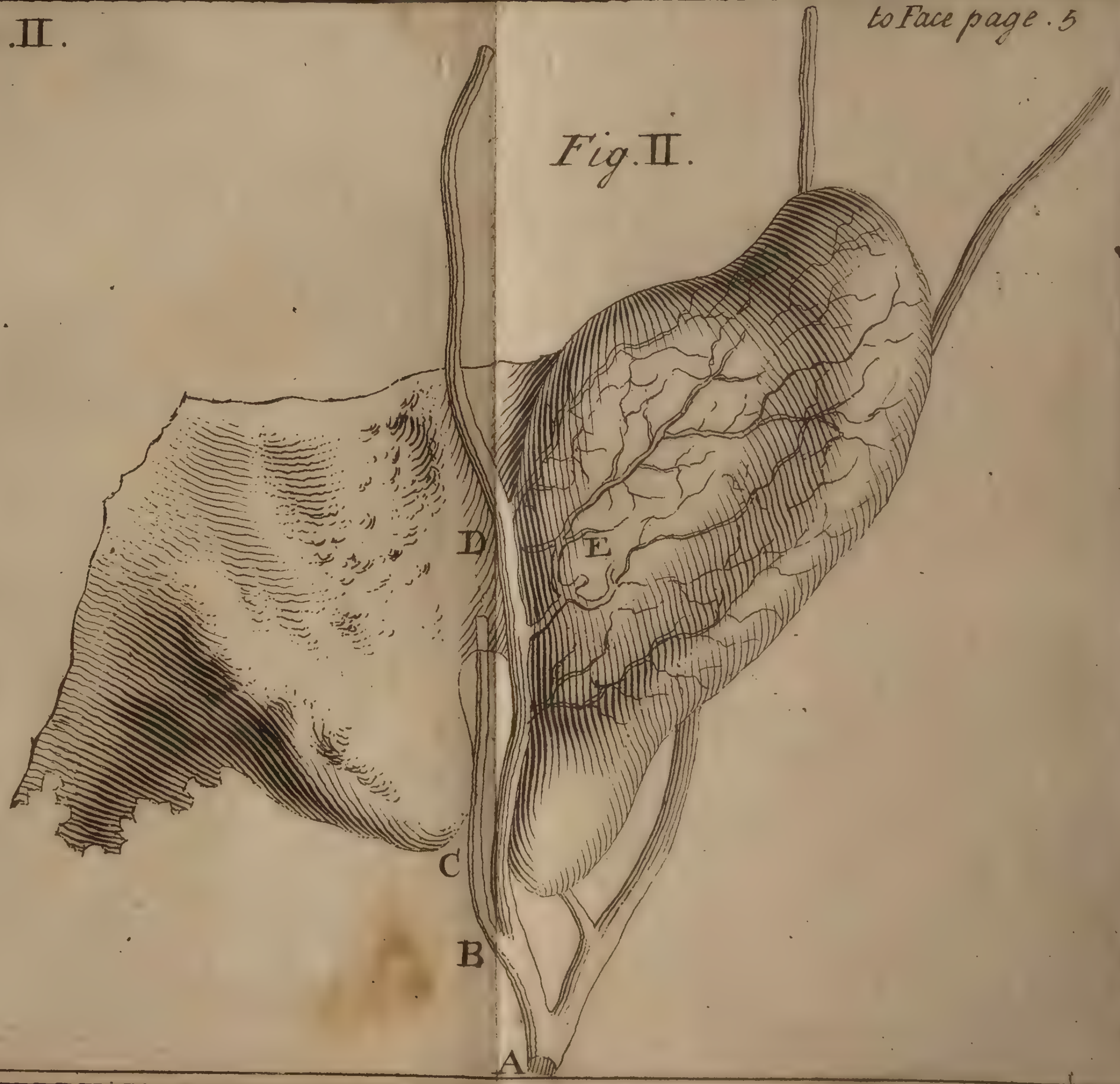


Fig. II.



B Cole Sculp

Of Veins.

The Veins are Ramifications of the Ex-
ernal Jugular, which follow the Diſtri-
ution of the Arteries. *See* Plate II. Fig.
, II.

Explanation of Plate II.

Fig. I. *repreſents the Arteries, which*
re diſtributed upon the fore-part of the Ear.
, the external Carotid, cut off above the
ngle of the Jaw. B, *the Branch which*
aſſes behind the Ear. C, *the Branch*
hich paſſes to the fore-part. D, *the Ra-*
ification of this Branch, which is diſtri-
uted to the Lobe of the Ear. E, *a Branch of*
n Artery, which paſſes through the Cartilage
om the back-part to the fore-part, and is
ſtributed to the Inſide of the Concha.

Fig. II. *repreſents the back-part of the*
ar, to ſhew the Arteries which are be-
nd the Ear. A, *the ſame Trunk of the*
arotid. B D, *the Branch which paſſes*
hind the Ear, and which as it paſſes fur-
ſhes it with many Ramifications. C, *a*
ranch which is diſtributed to the Caver-
ulæ *of the* Proceſſus Mammillaris. E,
e Branch which paſſes through the Car-
lage, to be diſtributed to the Inſide of the
oncha.

Of Nerves.

As for the Nerves, we ſhall treat them when we come to deſcribe all tho which belong to the Organ of Hearing.

The Hole of the Ear is divided into two Parts.

That which is called the Hole of th Ear, is a Paſſage, of which the *Conch* is as the *Veſtibulum* or Entry, and whic leads to a Membrane, called the Drum

1. *The Cartilaginous Part.*

This Paſſage is partly Cartilaginous, an partly Bony. The Cartilaginous Part i formed by the Contraction of the *Concha* this Part is about four or five Lines i length; the Cartilage which forms it i

Which is broke off in many Places.

continued in itſelf, but it is broke off an ſeparated in many Places, as by ſo many Cuts which are not join'd together again but by the Skin which covers the Inſide o the Paſſage. This Cartilaginous Part covers but half the Auditory Paſſage, almoſt all the upper Part being only encloſ'd by the Skin, which lines its Inſide. See *Plate* III. *Fig*. I. and II.

Explanation of Plate III.

Fig. I. *repreſents the Cartilage of the Ear, and the cartilaginous Paſſage diveſted of all their Integuments.* A, *the Cartilage of the Ear, with its Folds.* B, *the cartilaginous Paſſage growing ſomething flat.*

C,

to Face page 7

Plate. III.

Fig. I.

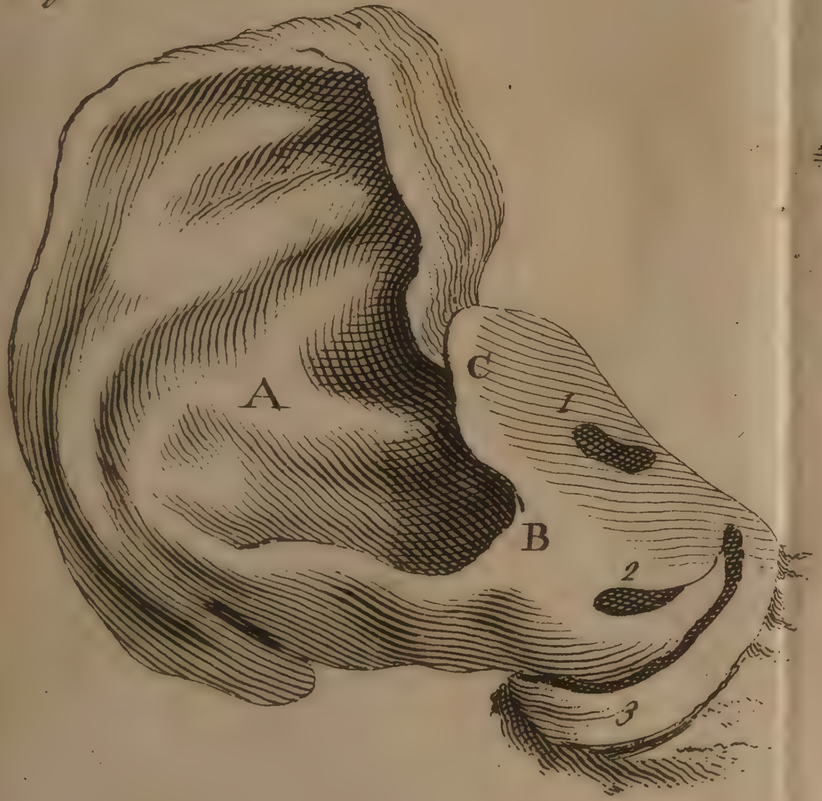


Fig. III.

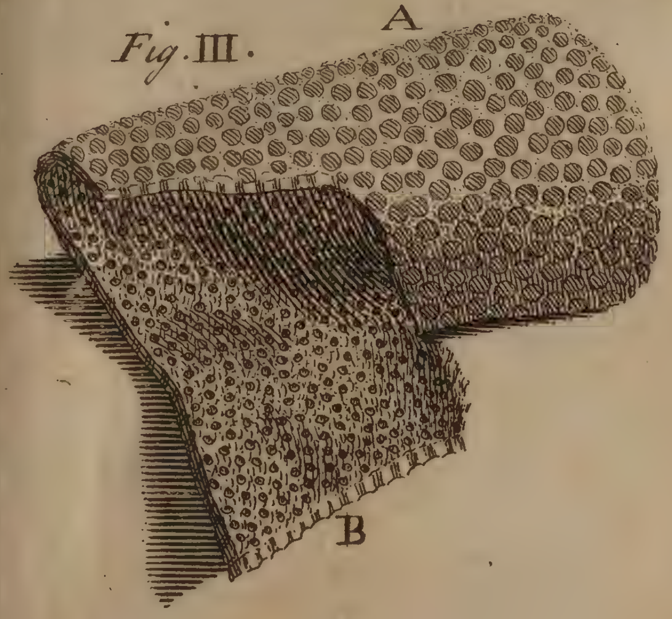


Fig. IV.

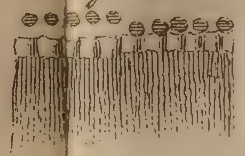
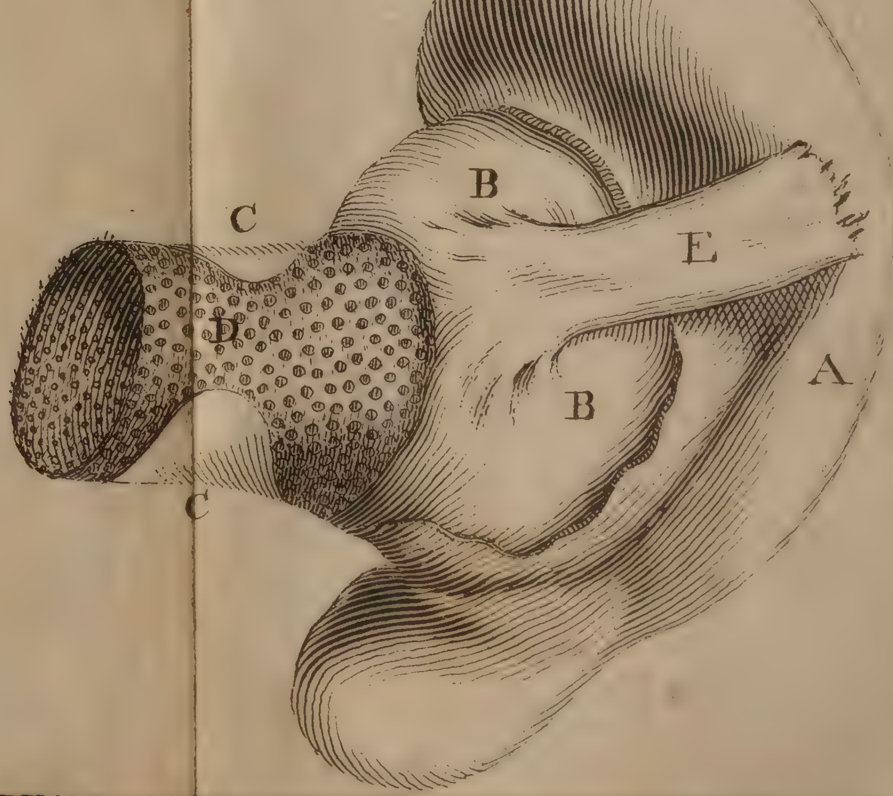


Fig II



B Cole. Sculp.

C, *the Part of the Cartilage which forms the Entrance of the Paſſage, and which makes a little Tongue at the forepart of the* Concha. 1, 2, 3, *The three Interruptions of the cartilaginous Paſſage.*

Fig. II. *repreſents the back Part of the Ear, and the upper Part of the cartilaginous Paſſage, with the Ligament, which ties the* Concha *to the temporal Bone.* A, A, *the back part of the Ear,* B, B, *the back part of the* Concha, *diveſted of the Skin.* C, C, *the Appendixes which terminate the Cartilage in the upper Part.* D, *the ſuperior Part of the Paſſage, which is form'd of nothing but of a glandular Membrane.* E, *the Ligament of the Ear revers'd.*

Fig. III. *repreſents the glandular Membrane, which inveſts the cartilaginous Paſſage; it appears in this place three times larger than Nature, for the better diſtinguiſhing all the Parts.* A, *the exterior Part of the glandular Membrane.* B, *the Paſſage open'd, in which the ſmall Hairs and the Orifices of the execretory Ducts of the Glands are viſible.*

Fig. IV. *repreſents the Diameter of the Part of the Paſſage, to ſhew how the Glands are half buried in the Thickneſs of the Membrane: Some of them are drawn out, to ſhew more plainly how deep they are buried.*

And cover'd with a Skin.

Adorn'd with many little Glands.

This Skin, which is a Continuation o that which is in the fore-part of th *Concha*, is ſtrew'd with an infinite Number of ſmall Glands of a yellowiſh Colour, and a little inclining to an oval Figure, which lie under this Skin, and are ſomewhat depreſs'd in its Thickneſs. Each Gland has a ſmall Duct, which opens into the Cavity of the Paſſage among the little Hairs with which it is ſtor'd: And theſe are the ſmall Ducts which emit that thick glutinous and yellow Matter, which is commonly found in the auditory Paſſage. This cartilaginous Paſſage ends by adhering to many Inequalities, which are at the entrance of the bony Canal; which is only a Continuation of that which is Cartilaginous. Theſe Inequalities are pretty conſiderable on that ſide of the Entrance next the Face, to which the Cartilage ſtrictly adheres. And as there are but few of theſe Inequalities at the oppoſite Side, next to the back part of the Head, the Cartilage is connected in this place to the Bone by a ſtrong Ligament; which coming from the Extremities of the *Concha*, paſſes along the membranous Part of the cartilaginous Paſſage, and is inſerted into a ſmall Cavity in the *Os Temporale*,

And is connected to the Os Temporum *by a Ligament.*

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Plate. IV.

Fig. I.

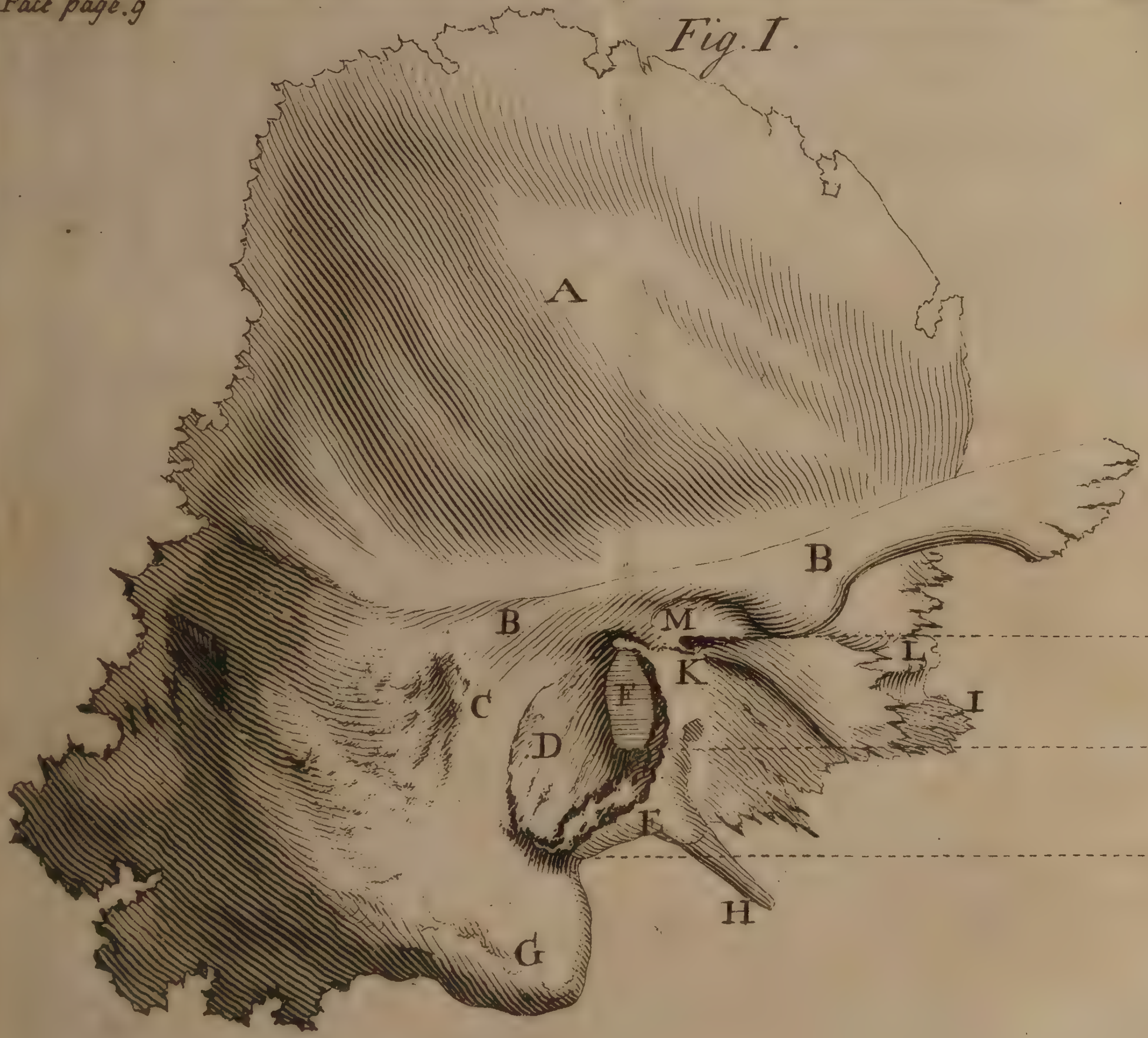
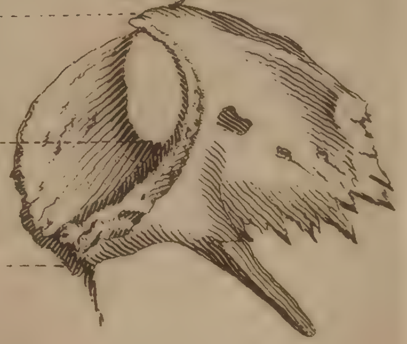


Fig. II.



B. Cole. Sculp.

Temporale, at the Entrance of this bony Canal. See *Plate* III. *Fig*. II, III, IV. and *Plate* IV. *Fig*. I.

Explanation of Plate IV.

Fig. I. *repreſents the* Os Temporale *bare.* A, *the ſcaly Part of this Bone.* BB, *the* Proceſſus Zygomaticus. C, *the little Cavity, into which the Ligament of the Ear is inſerted.* D, *the Entrance of the bony Paſſage of the Ear.* E, *the Inequalities which are on that Side of this Entrance next the Face.* F, *the* Membrana Tympani, *in its Scituation.* G, *the* Proceſſus Mammillaris. H, *the* Proceſſus Styloides. I, *the Tube, which incloſes the internal Carotid.* K, *a ſmall* Sinus, *which is between the bony Paſſage and the ſcaly Part of the* Os Temporale, *through which the external Muſcle of the* Malleus *penetrates into the* Tympanum. L, *the Extremity of the bony Paſſage, which forms part of the Paſſage which goes from the Ear to the Palate.* M, *the Cavity, into which the Condyloide Proceſs of the lower Jaw is inſerted.*

Fig. II. *repreſents the bony Paſſage, taken off from the temporal Bone.*

2dly. The bony Part.

This bony Part of the Auditory Paſſage, appears as if it was join'd to the *Os Temporale*. This Paſſage is, as it was ſaid before, the Continuation, or rather the Foundation of the cartilaginous Paſſage: Its Bore is a little Oval at the Beginning, but the more it advances towards the Extremity, it grows flat.

The cartilaginous and bony Parts form the auditory Paſſage.

That which is called the Auditory Paſſage, is form'd of a cartilaginous and bony Canal, placed one at the End of the other; this Canal runs obliquely and grows curv'd. For its Courſe, which at firſt aſcends and proceeds from the hind part to the fore-part, as far as its Middle, turns aſide afterwards, and deſcends again, always proceeding forwards as far as the *Membrana Tympani. See* Plate IV. Fig. I, II.

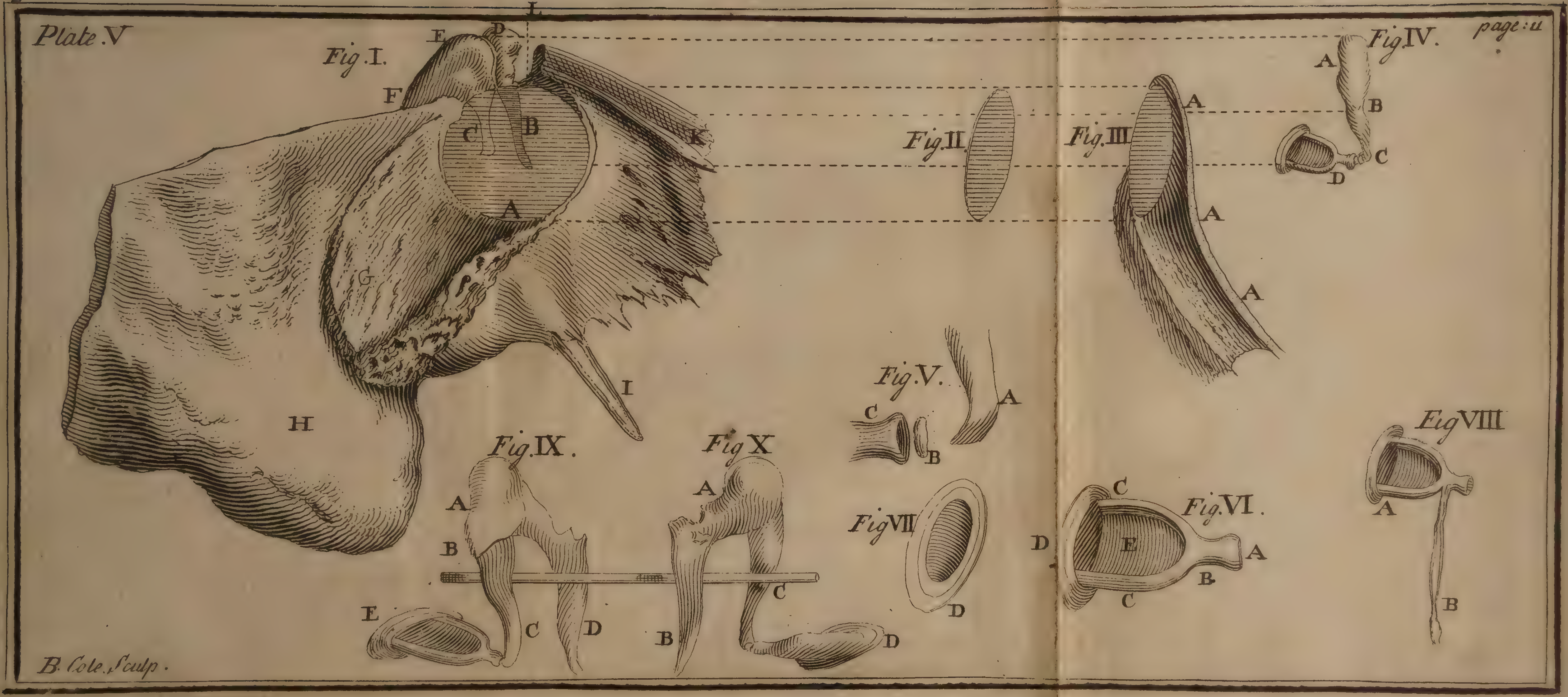
The external Part of the Organ of Hearing, is ſeparated from the internal, by the Membrana Tympani.

At the End of this Paſſage we find the *Membrana Tympani*, which ſeparates the above deſcrib'd external Ear from the Internal, and exactly cloſes up the Extremity of the Paſſage, as before taken notice of. This Partition is compos'd of a thin, dry, firm, tranſparent Membrane, almoſt round, and connected into a hollow Groove in the Circumference, at the end of the bony Paſſage. This Groove lies nearer the Inſide of the Head at its Bottom

I I

Plate V

page: 11



B. Cole Sculp.

tom than at its Top; it does not make a compleat Circle, but ends at the upper parts of its Circumference. Although this Membrane be extended, yet it does not make a plain Superficies; but it is indented inwards, by being fixed to the Handle of the Malleus. *See* Plate V. Fig. I, II, III. and Plate VII. Fig. I, II.

Explanation of Plate V.

Fig. I. *repreſents the temporal Bone twice as large as Nature, in which all the ſcaly Part is cut off, and but as much of the bony Paſſage taken away, as was neceſſary to ſhew the* Membrana Tympani *bare.* A, *the* Membrana Tympani *in its Scituation, and ſeen in the Front.* B, *the Handle of the* Malleus, *which is join'd to the back part of this Membrane.* C, *the long Branch of the* Incus, *which appears croſs this Membrane, though it is a little way remov'd from it.* D, *the Head of the* Malleus. E, *the maſſy Part of the* Incus, *with its ſhort Branch.* F, *which in this Section appears plainly.* G, *the bony Paſſage, half of which is cut off.* H, *the* Proceſſus Mammillaris. I, *the* Styloides. K, *the external Muſcle of the* Malleus *in its Scituation.* L, *a punctur'd Line, which ſhews the*

the thin Proceſs of the Malleus, *into which this Muſcle is inſerted.*

Fig. II. *repreſents the* Membrana Tympani *ſeen ſideways, to ſhew the better how it inclines.*

Fig. III. *repreſents the* Membrana Tympani *in the ſame View, and fix'd in the Extremity of the bony Paſſage; it alſo ſhews in what manner the Side of this Paſſage next the Face recedes, at the lower part from the* Membrana Tympani, *and how it approaches inſenſibly nearer to it as it aſcends.* AAA, *the Side of the bony Paſſage next the Face.*

Fig. IV. *repreſents the* Incus, *and the* Stapes *in their Scituation ſideways.* A, *the maſſy Part of the* Incus. B, *the ſhort Branch of the* Incus, *which in this Scituation appears exactly in the Front.* C, *its long Branch.* D, *the Head of the* Stapes, *which is joined with the long Branch of the* Incus, *by the Intervention of a fourth little Bone.*

Fig. V. *repreſents the Beak of the long Branch of the* Incus, *the fourth little Bone and the Head of the* Stapes *with its Cavity; all of them being four times larger than Nature.* A, *the Beak of the long Branch of the* Incus. B, *the fourth little Bone.* C, *the Head of the* Stapes *with its Cavity.*

Fig. VI. *repreſents the* Stapes *five times larger than Nature.* A, *the Head of the* Stapes. B, *its* Collum *or Neck.* C C, *its Branches, which are hollow like a Gutter.* D, *its Baſis.* E, *the Membrane of the* Stapes.

Fig. VII. *repreſents the Baſis of the* Stapes *ſeen in the ſame Senſe, to ſhew that it is hollow like a Gutter.* D, *the Baſis of the* Stapes.

Fig. VIII. *repreſents the* Stapes *with its Muſcle in its natural Scituation.* A, *the* Stapes. B, *its Muſcle, the whole being repreſented twice as large as Nature.*

Fig. IX. *repreſents the* Officulæ *ſeen in the Scituation they would be in, if the Eye was placed in that Paſſage which penetrates into the* Proceſſus Mammillaris. A, *the maſſy Part of the* Incus. B, *its ſhort Branch ſeen in the Front.* C, *its long Branch.* D, *the back part of the Handle of the* Malleus. E, *the upper part of the* Stapes.

Fig. X. *repreſents the* Officulæ *in their Scituation, view'd from the oppoſite Side, the Eye being placed in the Paſſage which paſſes from the Ear to the Palate.* A, *the Head of the* Malleus, *which covers the maſſy Part of the* Incus, *and its ſhort Branch.* B, *the Handle of the* Malleus. C, *the long*

long Branch of the Incus. D, *the* Stape *ſeen ſideways: The Stick which croſſes th* Oſſiculæ *is placed here, to diſtinguiſh which are placed before and which behind, in theſ different Views.*

Explanation of Plate VII.

Fig I. *repreſents the back part of the temporal Bone, with as much of it cut off as was neceſſary to ſhow the* Membrana Tympani, *upon which the back part of the* Malleus *and* Incus *is ſhewn, with the ſmall Branch of a Nerve, called the* Chorda Tympani, *and the Tendon of the external Muſcle of the* Malleus, *beſides the Cavity, upon which the Head of the* Malleus *and the maſſy Part of the* Incus *reſts, all in their natural Scituation.* A, *the back part of the ſcaly part of the temporal Bone.* B, *The* Proceſſus Mammillaris, *in the ſame View.* C C, *the* Os Petroſum *cut off.* D, *the* Membrana Tympani. E, *the* Malleus. F, *the* Incus *with its ſhort Branch, reſting upon the Entrance of the Paſſage, which penetrates into the* Cavernulæ *of the* Proceſſus Mammillaris. G, *the* Foramen *of the auditory Nerve.* 1. *The Tendon of the external Muſcle of the* Malleus. 2, 3. *The* Chorda Tympani.

Fig.

to Face page. 14

Plate VII.

Fig. I.

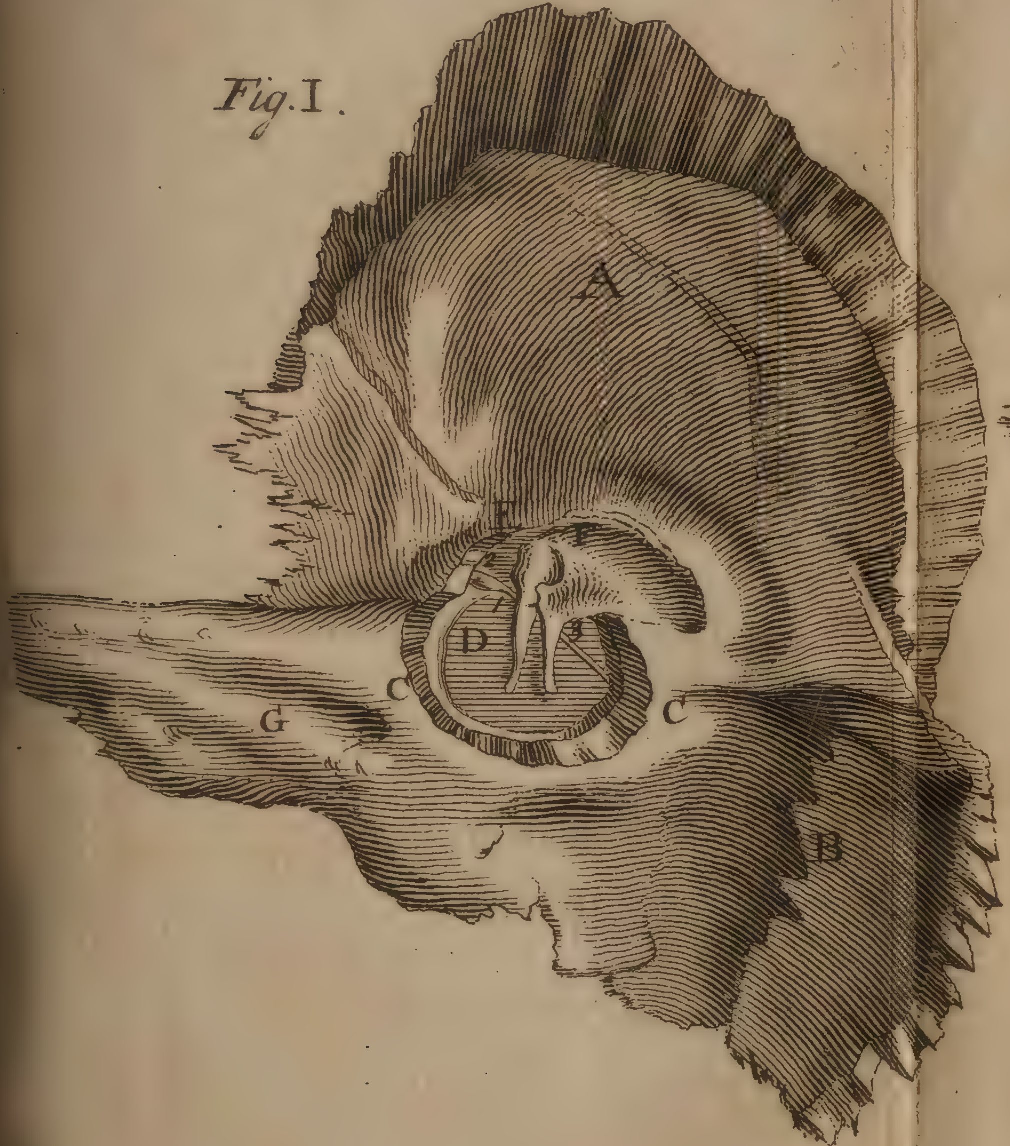
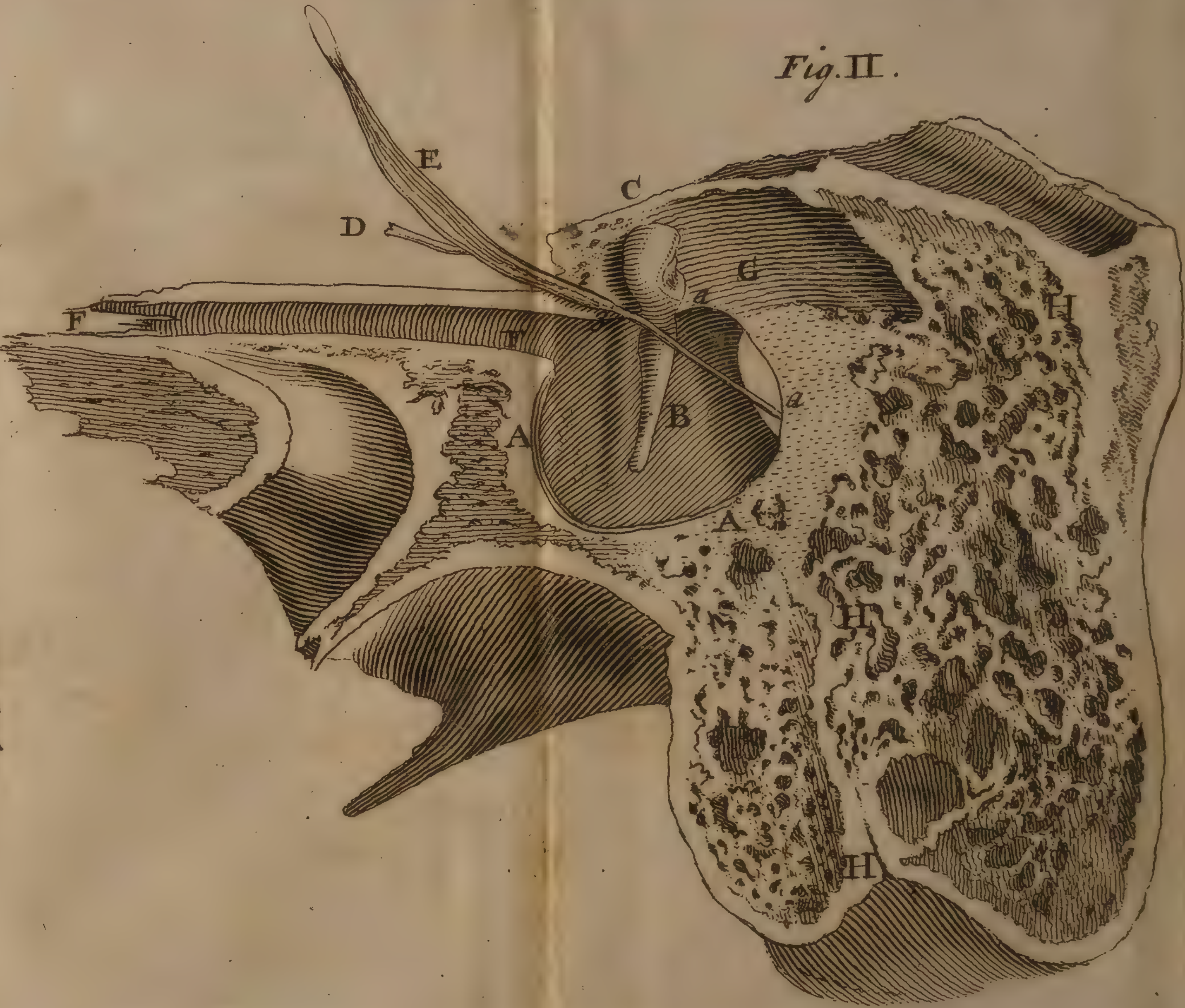


Fig. II.



B. Cole. Sculp.

Fig. II. *likewiſe repreſents the back part of the* Os Temporale *twice as large as Nature, all the ſcaly Part of which is taken away, and is ſaw'd from the Top to the Bottom, according to the Plan of the Groove, in ſuch a manner, that it is divided through the Middle of the* Proceſſus Mammillaris: *By this is ſhewn the Groove which receives the* Membrana Tympani *into it, and the Place where this Groove is wanting; it alſo ſhews how the Side of the bony Paſſage, next the Face grows flat near its Bottom, and covers a Part of the* Membrana Tympani; *and laſtly, it diſcovers all the* Cavernulæ *of the* Proceſſus Mammillaris. AA, *the Groove.* a a, *the Place where it is wanting.* B, *the Side of the bony Paſſage next the Face, which grows flat in this Place.* C, *the* Malleus. D, *the* Chorda Tympani *which is drawn inwards, to ſhow how it paſſes over the external Muſcle.* 2, 3. *The ſmall Sinus which is excavated out of the Bone above the Groove, and which ſerves as a Pulley to the Muſcle.* E, *the external Muſcle, which is alſo drawn inwards.* F F, *the bony Part of the Paſſage, which goes to the Palate.* G, *the Paſſage which leads into the* Proceſſus Mammillaris. H, H, *the* Cavernulæ *of the ſame Proceſs.*

The firſt Cavity in the internal Ear, called the Tympanum, *or Drum.*

Behind this Membrane is a Cavity called the *Tympanum*, from a ſort of Reſemblance it bears to the Box of a Drum, being on every Side ſurrounded with Bones, encloſ'd before by the above-mention'd Membrane, and behind by the Surface of the *Os Petroſum.* This *Tympanum* is two or three Lines deep, and ſix broad; there are two Paſſages in its Sides, one of which is ſcituated in the fore-part, and is called the Aqueduct, and opens into the Palate. The other is ſcituated on the oppoſite Part, and in the Top of the Cavity opens into the *Cavernulæ* or Sinuoſitys of the *Proceſſus Mammillaris*: At the Top of this *Tympanum* there is a ſmall Cavity, in which the Heads of the *Oſſicula*, (which we ſhall deſcribe in the ſequel) are placed. The Cavity of the *Tympanum* is rugged, unequal, and furniſh'd with a Membrane, which is ſtrew'd with a great Number of Veſſels, ſome of which are Ramifications of the carotid Artery, which are diſtributed to the *Dura Mater*: The *Foramina* through which they paſs are placed in the ſuperior Part of the *Tympanum*, and very nigh the *Foramen*, through which this Artery belonging to the *Dura Mater* enters the *Cranium.*

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Plate IX.

Fig. I.

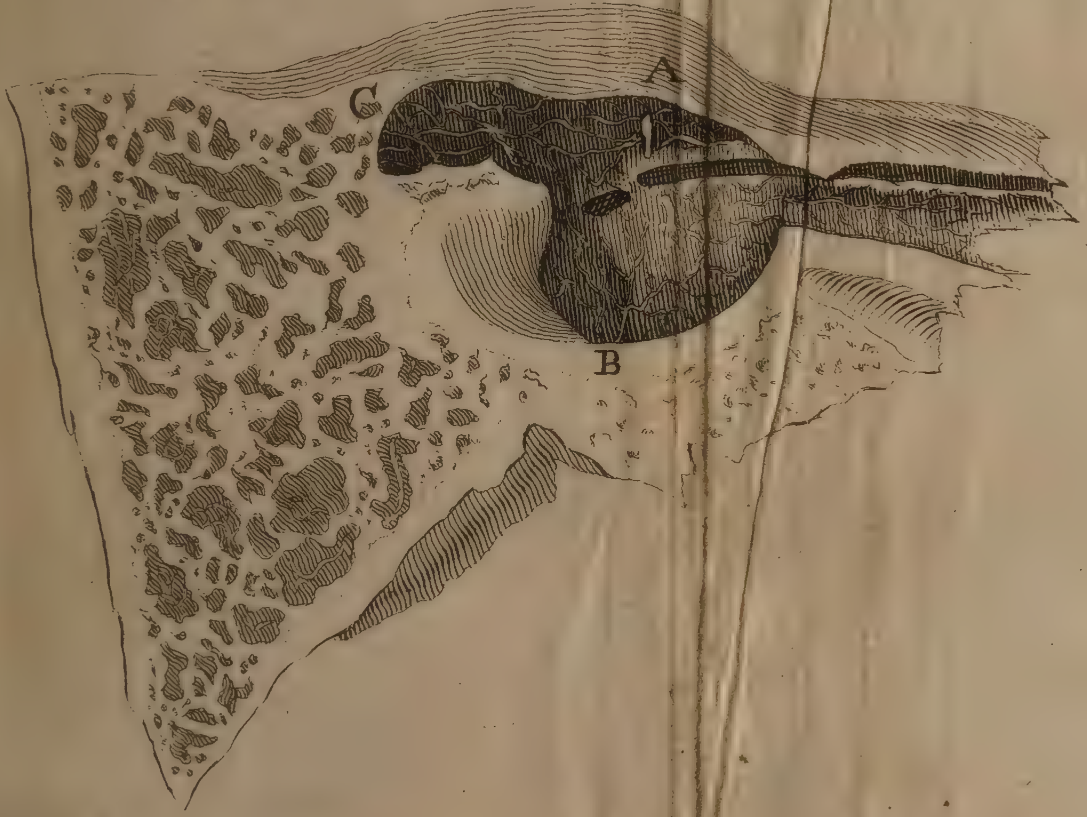
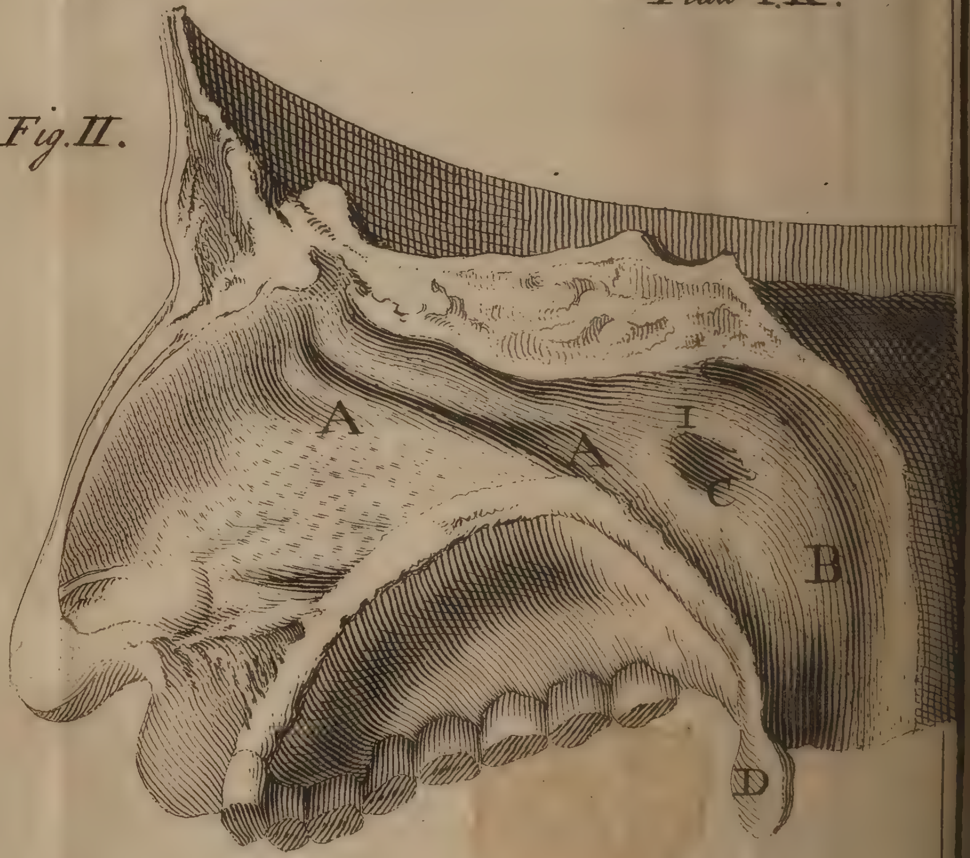


Fig. II.



B. Cole Sculp.

ium. The others are Ramifications of hoſe that furniſh the Membranes, which over the *Cavernulæ* of the *Proceſſus Mam-illaris.* *See* Plate IX. Fig. I.

Explanation of Plate IX.

Fig. I. *repreſents the temporal Bone wice as large as Nature, all the ſcaly Part eing taken off, and being ſaw'd perpendicu-ar down a little diſtance before the Groove, ſhew the Depth of the* Tympanum *and he* Cavernulæ *of the* Proceſſus Mammil-aris, *to diſcover their Veſſels, and thoſe hich are ſpread upon the Membrane, which nes the* Tympanum. A, *a conſiderable rtery, which is a Ramification from that f the* Dura Mater. B, *a Vein which is ent off at the Entrance of the internal Ju-ular, which is at the bottom of the* Tym-anum. C, *the Veſſels which are ſent off rom the* Cavernulæ *of the* Proceſſus Mam-nillaris, *to be diſtributed to the* Tympanum.

Fig. II. *repreſents half a Head one third eſs than Nature, all the upper Part of the* ranium *of which is taken off, and the reſt ut perpendicular through the Middle of the Noſe, to ſhew the Orifice of the Paſſage which goes from the Ear to the Palate.* A A, *the Cavity of the Noſe, with its*

Laminæ. B, *the* Fundus *of the Palate.* C, *the Orifice of the Paſſage which leads from the Ear to the Palate.* 1. *Its cartilaginous Side, which forms a Border in the ſhape of a Creſcent.* D, *the* Uvula *cut through the middle.*

Has five remarkable Things in it.

There are five remarkable Things to be taken notice of in the whole *Tympanum, viz.* Two Paſſages, two *Feneſtræ,* four ſmall Bones, three Muſcles, and a Branch of a Nerve.

1. *Two Paſſages, one of which paſſes into the Palate.*

The Paſſage which paſſes from the Ear into the Palate, is called Aqueduct, not only becauſe it is like a Canal, but alſo becauſe it can make room for the Filth and other extraneous Humours, which are often gathered in the Inſide of the *Tympanum,* not being provided with any ſmall Valve to hinder their Egreſs. This Paſſage is bony as it comes from the *Tympanum,* and its Inſide is lin'd with the ſame Membrane which covers the *Tympanum.* It is ſcituated in the fore-part of the bony Canal, which encloſes the internal carotid Artery, and afterwards proceeding about three Lines in length, it terminates by many Unevenneſſes, which form Gaps, to which another Tube partly membranous and partly cartilaginous is fix'd, which compoſes the reſt of the Paſſage. The membranous Side of this Paſſage faces the Hole of the Ear, and the cartilaginous Part the back-part of the Head. This Tube runs obliquely backwards as far as the Root of the Noſe, at the Extremity of the Palate, a little above the *Uvula*, and proceeding about the length of an Inch, it ends near the Middle of the interior Part of the internal Side of the Proceſſes, which are called *Pterigoidei*. This Paſſage is much larger than that which is bony; it is cover'd on the Outſide by one of the Muſcles, which ſerve to dilate the *Pharynx*, and on the Inſide by a glandulous Skin, which is a Continuation of that which lines the Inſide of the Noſe. The cartilaginous Part of this Paſſage grows thick towards its End, and forms a Border in the ſhape of a Creſcent. The Inſertion of the Aqueduct is ſo diſpos'd, that the Air which is receiv'd into the Mouth through the Noſtrils, is neceſſarily drawn into it. For the Horns of the Creſcent, particularly the lower one, extend in ſuch a manner into the Inſide of the Noſtrils, that it is impoſſible but that the Air muſt ſtrike againſt theſe Horns as it paſſes along; and that a great Part of this Air being ſtop'd, and as it were intercepted in the Paſſage, muſt enter into the Aqueduct; otherwiſe all the Air would paſs through the great Apertions of the Noſtrils, directly into the Cavity of the Thorax. Mr. *Louver* has obſerv'd a like Piece of Mechaniſm in the Inſertion, or Opening of the axillary and carotid Arteries into the *Aorta*. For this Veſſel which paſſes out of the left Ventricle of the Heart, growing curv'd as it deſcends, would carry almoſt all the Blood which is ſent out of the Heart into its deſcending Trunk, if the axillary and carotid Arteries, which ariſe from the Middle of the Curve of the *Aorta*, were not diſpos'd, in ſuch a manner, that that Side of every Orifice which is the fartheſt from the Heart, being more elongated than the other, they ſtop a great part of the Blood as it paſſes before their Orifices. *See* Plate VIII. Fig. I, II. and Plate IX. Fig. II.

Explanation of Plate VIII.

Fig. I. *repreſents the temporal Bone twice as large as Nature, the ſcaly Part being taken off, and part of the bony Paſſage taken away, and in general all the Parts of the* Tympanum, *which might hinder the View of the Surface of the* Os Petroſum, *which* page 20

Plate VIII.

Fig. I.

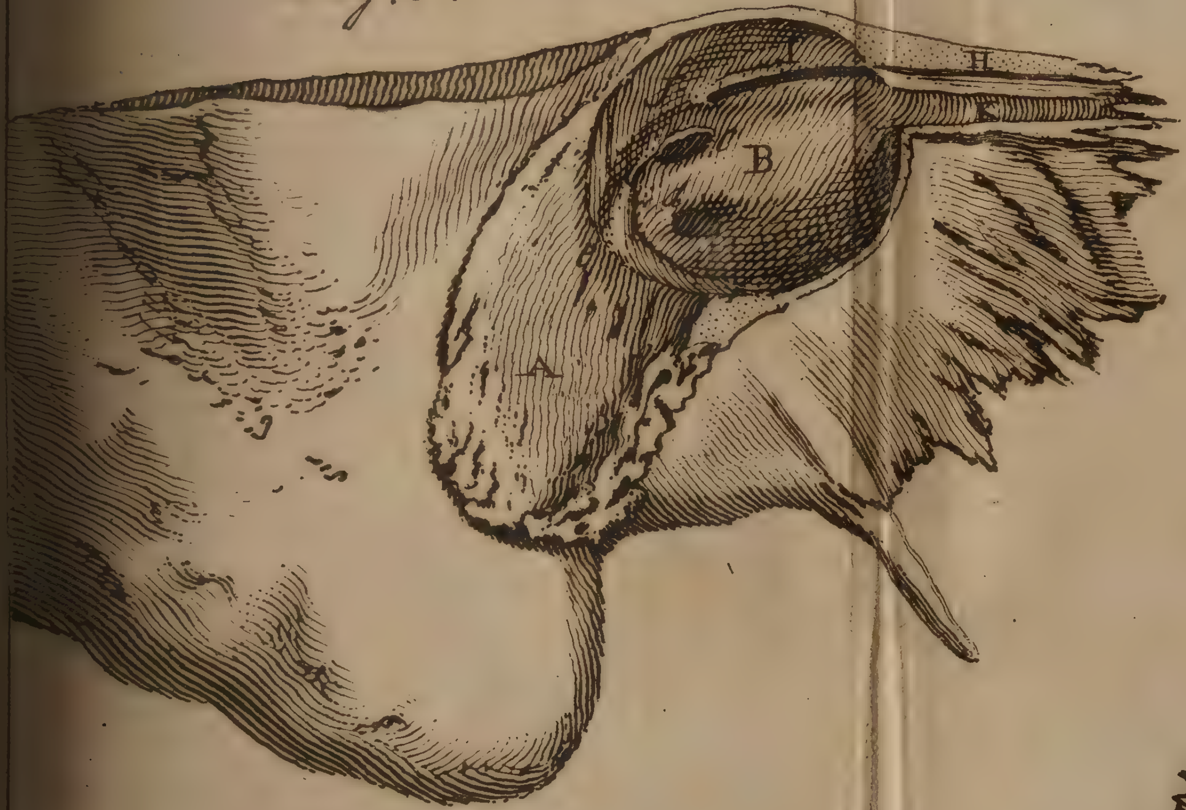
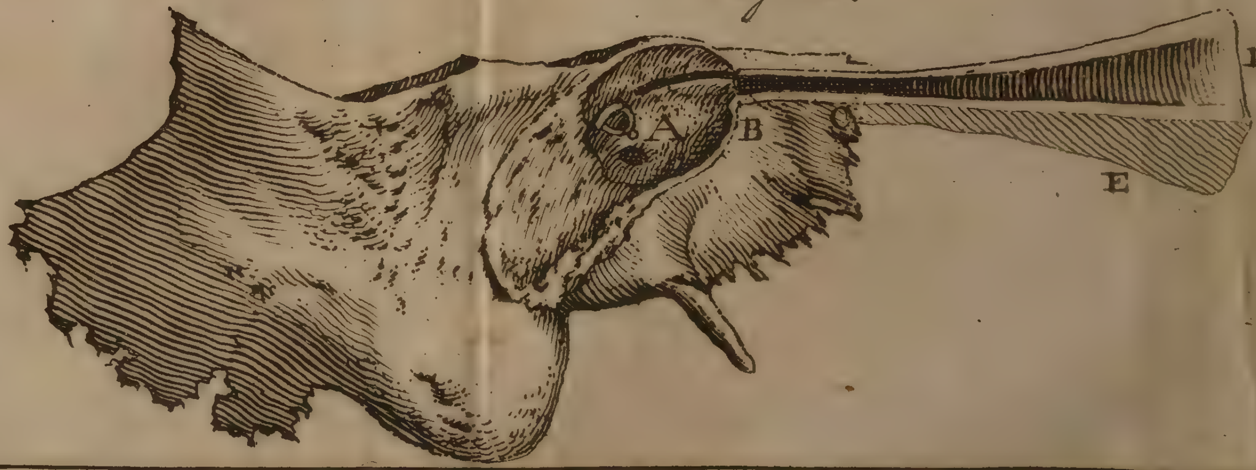


Fig. II.



which makes one of the Parietes *of the* Tympanum. A, *Part of the bony Paſſage.* B, *the Protuberance which is in the Surface of the* Os Petroſum, *and which covers he* Lamina Spiralis. C, *the* Feneſtra Ovalis. D, *the* Feneſtra Rotunda. E, *the bony Canal which encloſes the Muſcle of he* Stapes, *from which the Tendon is ſhown extruded, to be inſerted into the Head of the* Stapes. F, *the Canal which encloſes the* Portio Dura *of the auditory Nerve.* G, *a punctur'd Line to ſhew the Circumference which the* Membrana Tympani *takes up, and how large the* Tympanum *is.* H I, *the Semi-Canal, which encloſes the internal Muſcle of the* Malleus. H, *that Part of this Semi-Canal, which is extruded from the* Tympanum. I, *the Part which is in the* Tympanum. K, *half of the bony Paſſage, which leads from the Ear to the Palate.*

Fig. II. *repreſents the temporal Bone, pretty nigh in the ſame View as the preceeding Figure, but only as large as Nature, to ſhew the* Stapes *in its Situation, and the Canal which leads from the Ear to the Palate in its natural Direction.* A, *the* Stapes *in its Scituation.* B C, *the bony Part of the Canal.* D, *its cartilaginous Part, which grows thicker and larger at its Extremity.* E, *its membranous Part turn'd back.*

The other into the Cavernulæ of the Proceſſus Mammillaris.

The other Paſſage, which is ſcituat
on the Top of the *Tympanum* is broad
but much ſhorter than the Aqueduct, a
penetrates, as before mentioned, into t
Cavernulæ of the *Pro ceſſus Mammiform*
See Plate VII. Fig. II. Plate IX. Fig. I

2dly, *Two Apertures, or* Feneſtræ.

The two Apertures, or *Feneſtræ* of t
Tympanum, are placed in the Surface
the *Os Petroſum*, which lies directly o
poſite to the *Membrana Tympani*. The
Petroſum being about the thickneſs of
Line where they pierce, is the Reaſ
why each of theſe *Feneſtra* forms a ſort
a ſmall Paſſage, the Thickneſs of a Lin
The firſt *Feneſtræ* is called Oval from i
Figure, and is ſcituated a little higher th
the other. At the end of its Paſſage
has a ſmall Border in the form of Folia
upon which the Baſis of one of the ſma
Bones, term'd *Stapes*, is placed. T
other *Feneſtra*, which is call'd *Rotunda*
Round, though it is like the other of a
Oval Figure, has a Groove in the mi
dle of its Paſſage, for the Inſertion of
dry, thin, and almoſt tranſparent Me
brane, very like that of the *Tympanum*
See Plate VI. Fig. I. Plate VIII. Fig.
II. and Pate IX. Fig. I.

Expla

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Plate VI

Fig.I.

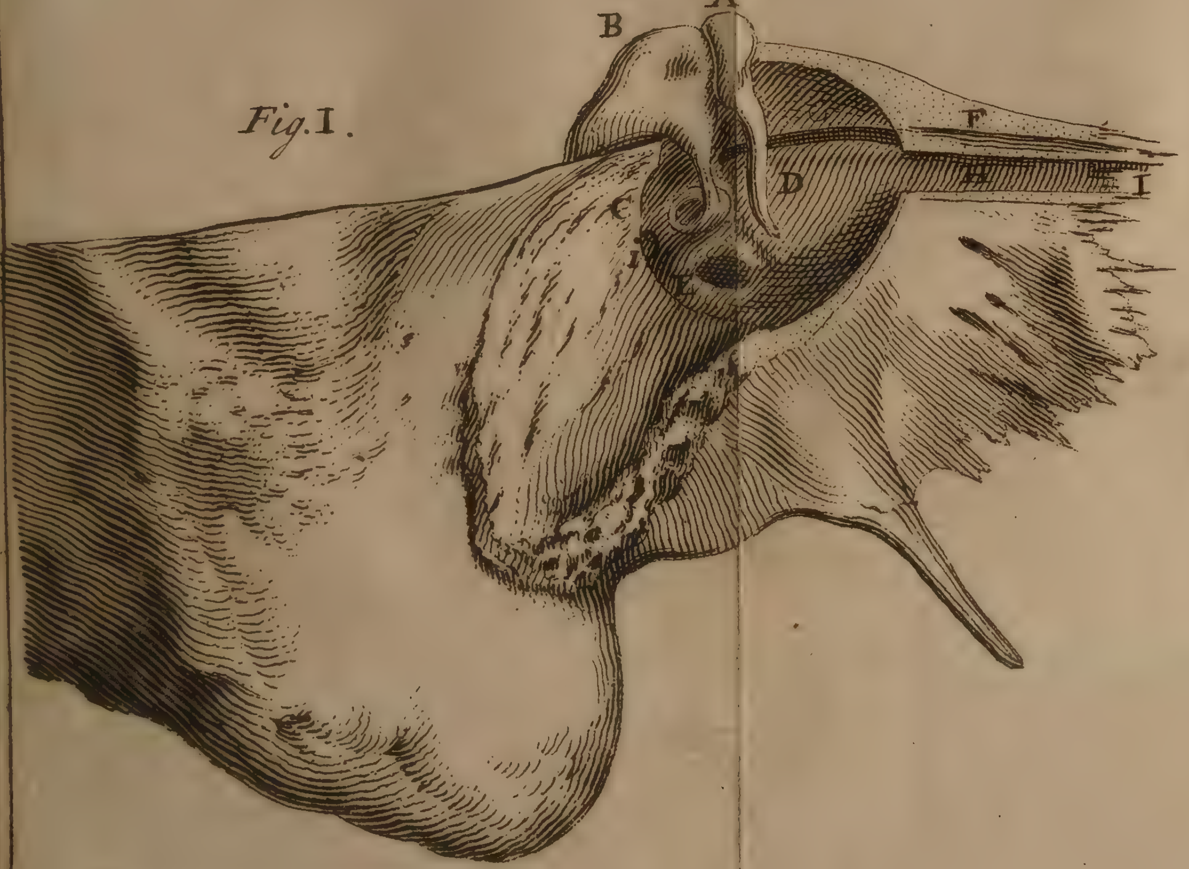


Fig.V.

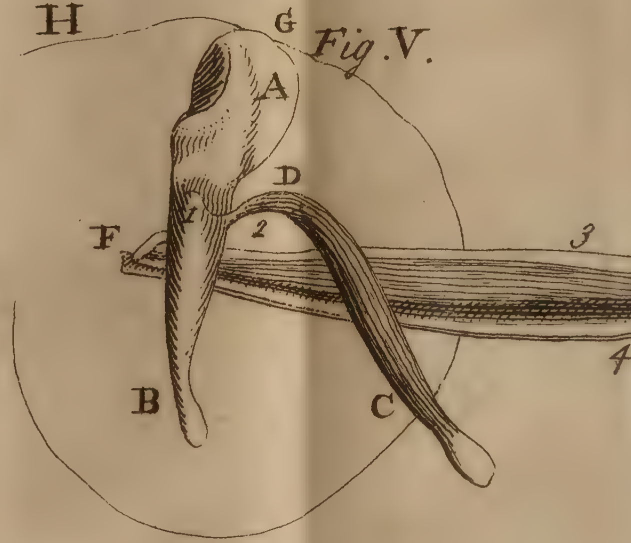


Fig.II

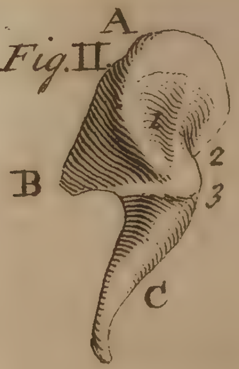


Fig.III.

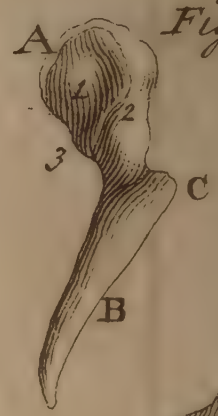
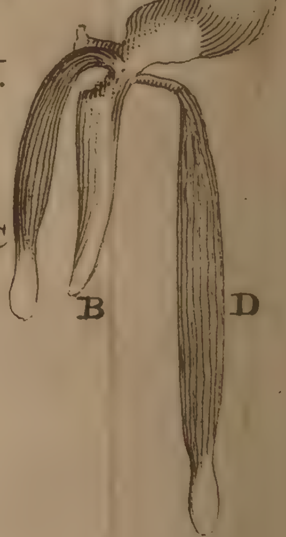


Fig.IV.



B Cole Sculp

Explanation of Plate VI.

Fig. I. *repreſents the ſame Bone, cut*
the ſame manner as Fig. I. *of* Plate V.
he whole being alſo twice as large as Na-
ure, only the Membrana Tympani *is taken*
f, to ſhew the Officulæ *in their Scituation,*
nd the Inſide of the Tympanum *with its*
ntain'd Parts. A, *the* Malleus. B, *the*
icus. C, *the* Stapes *ſeen in the Front,*
s Head being cover'd by the Beak of the
ng Branch of the Incus; *its Baſis ſtopping*
the Feneſtra Ovalis. D, *the* Fundus *of*
e Tympanum, *which is the Surface of the*
s Petroſum. E, *The* Feneſtra Ovalis.
, G, *the Semi-Canal, which incloſes the in-*
rnal Muſcle of the Malleus. F, *that Part*
the Semi-Canal which is ſituated out of the
ympanum. G, *the part which is in the In-*
de of the Tympanum. H I, *the bony Part*
the Paſſage, which goes from the Ear
the Palate, half of it being cut off to
ew its Cavity. i, *the End of the Tube,*
hich encloſes the Muſcle of the Stapes.

Fig. II. *repreſents the* Incus, *on that*
ide where it is articulated with the Malleus.
, *the maſſy Part of the* Incus. B, *the*
ort Branch, placed almoſt in the Front. C,
e long Branch. 1, *The firſt Cavity.* 2, *the*
econd. 3, *The Eminence betwixt the other*
wo Cavities, mark'd by a punctur'd Line.

Fig. III. *repreſents the* Malleus *on th Side where it is articulated, to ſhew i Eminences and Cavity, which ſerve for i Articulation.* A, *its Head.* B, *its Handle.* C, *the large Proceſs.* 1. *The fir Eminence;* 2. *The ſecond Eminence;* 3. *Th Cavity which is between them, mark'd by punctur'd Line.*

Fig. IV. *repreſents the* Malleus *with i two Muſcles, the Eye being plac'd in th Aqueduct, to ſhew the Compaſs of the tw Muſcles, particularly that of the Intern which croſſes the* Tympanum *in its Progreſs to be join'd to the* Malleus. A, B, *th* Malleus. C, *the external Muſcle.* D *the internal Muſcle.*

Fig. V. *repreſents the Circumference the* Tympanum, *and the fore-part of th* Malleus, *with its Muſcles in their Scituation* A, *the Head of the* Malleus. B, *th Handle.* C, *the external Muſcle of th* Malleus. D, *its Inſertion.* E, *the internal Muſcle.* F, *the Place where it bends to be inſerted in the Handle of the* Malleus *below the external Muſcle.* G H, *the Circumference of the* Tympanum; 1. *The larg Proceſs of the* Malleus *ſeen in Front;* 2 *The thin Proceſs, into which the externa Muſcle is inſerted;* 3, 4. *The nervous Coa of the internal Muſcle, open'd to ſhow th Muſcle.*

Th

This Figure ſerves to explain the Man-
ner in which the two Muſcles of the Mal-
leus *act, in the Contraction and Relaxation*
f the Membrana Tympani: *For their In-*
ertions make it eaſily be conceiv'd, that when
he external Muſcle C D, *acts alone, the Ex-*
remity of the Handle mark'd B *is drawn*
utwards, becauſe the Head of the Malleus
eſts againſt the Tympanum *at the Place* G;
ut when the two Muſcles act together, the
Extremity of the Malleus *being drawn in-*
vards by the internal Muſcle E F, *cauſes*
Tenſion in the Membrana Tympani;
ecauſe the external Muſcle C D, *draws,*
r at leaſt ſupports the Head of the Malleus,
vhich does not reſt againſt the Tympanum
t H, *as it does at* G.

3dly, Four little Bones.

The Malleus.

The firſt among the little Bones contain-
d in the *Tympanum*, which preſents itſelf
oView, is called the *Malleus*, becauſe it is
hicker at one of its Extremities, call'd the
Iead, and ſlenderer at the other, which is
alled the Handle. The Head of this Bone
fix'd in the above-deſcrib'd Cavity,
hich is in the Top of the *Tympanum*: At
e Side and a little towards the back-part
the Head of this Bone are two Protube-
nces, and a Cavity for its Articulation
ith the *Incus*. The other Part of the

Bone, which is thinner, ſlenderer, a
more elongated, call'd the Handle,
encreas'd in Bulk by two *Proceſſes*, t
largeſt of which is outermoſt, and is fix
to the *Membrana Tympani* : The othe
which is on one Side, is ſlenderer a
ſmaller, and receives the Tendon of
Muſcle. This Handle leans upon, a
is fix'd a little obliquely to the *Membra*
Tympani, and growing flat at its Extr
mity, is more firmly connected to it in t
Place : This little Bone is common
about the Length of four Lines, and t
Diameter of its Head is the Third of i
whole Length.

The Incus.

The ſecond little Bone is called *Incu*
or *Anvil*, becauſe of its Figure. The
are three Parts to be taken notice of
this Bone, *viz.* Its maſſy Part, whi
makes up the Body of the Bone, and
two Branches which are *Proceſſes*, a
ſeem like Legs to it : The maſſy Pa
has two Cavities and one Protuberanc
to anſwer the two Protuberances, and o
Cavity of the Head of the *Malleus*, t
be join'd to it by that ſort of Articulati
which is call'd *Ginglymus*, and which M
chanicks term Hinges. Almoſt all th
maſſy Part lies conceal'd in the aforeſa
Cavity, in the Top of the *Tympanu*

Th

he ſhorteſt of theſe Branches is placed the Entrance of the Paſſage, which oes into the *Proceſſus Mammillaris*, and Extremity is conceal'd and fix'd by a gament in a ſmall Cavity, which is at Entrance of this Paſſage. The other anch, which is the longeſt, deſcends per-ndicular into the *Tympanum*, and grow- curved within, on that Side oppoſite *Membrana Tympani*, it forms a little ak which is articulated, by the Help a fourth Bone, to the *Incus* which is third Bone. Stapes

The Stapes.

The *Stapes*, or Stirrop, is ſo call'd from exact Reſemblance to a Stirrop, having Branches plac'd upon a flat and l Baſis, pretty like that part of the rop upon which we lean our Foot; at the Top it has a ſmall Head, ch is like that Part through which Stirrop is tied. It is in this Part there is found a little Cavity, to re-e the fourth little Bone. The *Stapes* uated in ſuch a manner, that its Head g ſeen in the Front, almoſt hides its s; all the interior Part of the Branches Baſis of the *Stapes*, is form'd hol- like a Gutter. This ſmall Bone is 'd almoſt horizontal in this Cavity; two Branches and its Baſis make a

kind of a Frame, to the Bottom of whi
is fix'd and join'd a Membrane, in t
ſame manner as oil'd Paper is fix'd t
Window-Frame. This Membrane is
a fine Texture, and ſtrewed with a gr
Number of Veſſels. The Baſis of
Stapes is ſunk into the *Feneſtra Ova*
which it exactly cloſes up: It is fix'd
that Border which is made in the Form
Foliage, and which has been deſcrib
before, by the Help of a Membra
which connects it to it ſo exactly, tha
can't poſſibly by any Means be ſu
down into the Cavity, which is at
Bottom, nor lifted up to the Top of
Feneſtra, without breaking the Membra

The fourth little Bone.

The fourth little Bone is of a very
conſiderable Thickneſs, it is a little co
vex on the Side next to the Head of
Stapes, and as much, though but a lit
concave on the Side, which is articula
with the Beak of the *Incus*.

Theſe ſmall Bones are cover'd wit
Perioſteum, and there is no Cartilage fou
at the Places of their Articulation;
they are firmly connected together o
by Ligaments which ariſe from their E
tremities.

The *Malleus* and *Incus* are of a ve
compact and ſolid Subſtance; they o

e pierced by ſome *Foraminula*, which
ford an Entrance for the Veſſels which
ouriſh them. The *Stapes* on the contra-
is of a very light and porous Sub-
ance. *See* Plate V. Fig. I, IV, V. VI.
II, IX, *and* X. Plate VI. Fig. I, III,
d IV; *and* Plate VII. Fig. I, *and* II.

4thly, *Three Muſcles, two of which belong to the* Malleus, *viz. The External.*

Two of the three Muſcles which are
the *Tympanum* belong to the *Malleus*,
e third belongs to the *Stapes*: The
irſt of thoſe which belong to the
alleus, may be called External, be-
auſe it is ſituated upon the exterior Side
f the bony Canal, which paſſes from the
ar to the Palate, and continuing its
ourſe upwards and ſomewhat backwards,
enters the *Tympanum*, lying concealed
a very oblique *Sulcus*, which is exca-
ated directly above the Bone which has
at Groove in it, into which the *Mem-*
ana Tympani is inſerted. This *Sulcus* is
at which is ſeen in the upper part of
e bony Circle of the *Fœtus*, which we
all treat of in the Sequel. This Muſ-
le after it enters into the *Tympanum* is
mmediately inſerted into the thin Proceſs
f the *Malleus*, which has already been
eſcribed. *See* Plate V. Fig. I. Plate VI.
ig. IV, *and* V; *and* Plate VII. Fig. I,
nd II.

And the Internal Muſcle.

The ſecond Muſcle may be called Il ternal, becauſe it is hid in a bony Sem Canal, ſituated in the *Os Petroſum*, whi Bone makes one of the *Parietes Tympa* One Part of this Semi-Canal is withou the *Tympanum*, and is contained in th Top of the Paſſage, which goes fro the Ear to the Palate: The other Pa which is within the *Tympanum*, advances far as the *Feneſtra Ovalis*, and forms this Place a little Ridge, upon which th Tendon of the Muſcle runs, as upon a Pu ley, paſſing from one Side of the *Tymp num* to the other, and is inſerted into th poſterior Part of the Handle of the *Ma leus*, a little below the Inſertion of the ex ternal Muſcle, to draw it towards the O *Petroſum*. The Origin of this Muſcle exactly at the Place where the bony Pa of the Aqueduct ends; it is cover'd with nervous Coat, which forms a Sheath, whic accompanies it in all its Courſe, and firm ly connects it to the Semi-Canal. *Se* Plate VI. Fig. I, IV, *and* V.

And one to the Stapes.

The Muſcle of the *Stapes* is hid in bony Tube, which is formed out of th *Os Petroſum*, almoſt at the Bottom of th *Tympanum*, from whence this Muſcle take its Origin: It has a large fleſhy Belly which ends ſuddenly in a very ſmall Ten

don

on, which is inſerted into the Head of
ıe *Stapes*. The Tube which encloſes the
elly of this Muſcle is about two Lines
ong, and is much larger at its End, where
ıe Tendon of the Muſcle paſſes through
. *See* Plate V. Fig. VIII. *and* Plate
III. Fig. I.

A Branch of a Nerve.

The laſt Part to be taken notice of in
he *Tympanum*, is the ſmall Branch of a
Jerve which paſſes behind the *Membrana*
ympani, which ſome have miſtook for
he Tendon of one of the Muſcles which
elong to the *Malleus*; but which is a
ranch of the fifth Pair of Nerves, which
hall afterwards be deſcribed.

The ſecond Cavity of the internal Ear called the Labyrinth, is divided into three Parts.

The above-mention'd two *Feneſtræ*,
ave each of them an opening into a Ca-
ity, which is excavated out of the *Os Pe-*
roſum, which is call'd *Labyrinthus*, from
s being very intricate, becauſe of its ma-
y Windings: This Cavity is divided in-
o three Parts; The Firſt is that which
nay be called the *Veſtibulum*, or Entry of
he Labyrinth, becauſe it leads to the two
thers; The Second Part contains three
ound Canals, which being curv'd in the
Ialf Circle, I ſhall in the Sequel call them
he three *Canales Semi-Circulares*; they are
laced on that Side the *Veſtibulum*, to-
wards the back-part of the Head: the

Third Part is the *Cochlea*, which is ſituated on the contrary Side.

1ſt. The Veſtibulum.

The *Veſtibulum* is a Cavity almoſt round, formed out of the *Os Petroſum*, and about a Line and a half in Diameter: It is ſituated behind the *Feneſtra Ovalis*, and covered on the Inſide by a Membrane, furniſh'd with a great many Veſſels. There are nine *Foramina* in it, of which one has been already deſcribed, *viz.* the *Feneſtra Ovalis*, which forms an Entrance from the *Tympanum* into the *Veſtibulum*; the other eight are in the Cavity of the *Veſtibulum*: The firſt leading into the upper Range or *Scala* of the *Cochlea*; there are five more which afford an Entrance into the three Semi-circular Canals, and the two laſt through which two Branches of the *Portio Mollis* of the auditory Nerve paſs.

Which has nine Foramina.

2dly, The three Canales Semi-circulares, *viz.*

I ſhall give Names to the three *Canales Semi-circulares* to diſtinguiſh them, and ſhall take thoſe Names from their Situation: The firſt I call *Superior*, becauſe it takes up the upper Part of the Arch of the *Veſtibulum*; the ſecond *Inferior*, becauſe it ſurrounds its lower Part; and the third, which is placed more towards the Outſide, and is ſituated betwixt the other two, *Medius*.

The

Canalis Semi-circularis *Superior.*

The *Canalis Semi-circularis Superior* paſſing out of the *Veſtibulum*, runs from the fore-part to the back-part, afterwards growing curv'd turns a little from the back to the fore-part, proceeding as far as the Middle of the poſterior Part of the *Os Petroſum*, making a little more than a Half-Circle, and there it unites with the *Canalis Inferior.*

Inferior.

The other which I call *Canalis Inferior*, comes from the inferior Part of the *Veſtibulum*, and forms alſo a little more than a Semi-Circle, and joins itſelf to the ſuperior Canal, as has been before deſcribed. Theſe two Canals being joined together form but one, which advancing forwards a little obliquely, opens into the Middle of the *Veſtibulum.*

Medius.

The third, which I call *Medius*, has its two ſeparate Orifices, and forms no more han its Semi-Circle. The Bore of theſe Canals is ſometimes round and ſometimes oval, and is enlarg'd towards their Exremities, like the broad End of a Trumpet.

The ſix Extremities of theſe three *Canales Semi-circulares*, form only five Oriices into the *Veſtibulum*, ſince there is one of theſe Orifices common to both the Extremities of the ſuperior and inferior

Canals, as aforeſaid. Theſe Orifices are diſpoſed in ſuch a Manner, that there are two at the Top, two at the Bottom, and one in the Middle of the *Veſtibulum*.

The firſt, to begin from the Top to the Bottom, is the Orifice of the *Canalis Semicircularis Superior*, the other is one of the Orifices of the *Canalis Medius*: Theſe two Orifices are ſeparated near their Entrance into the *Veſtibulum*, only by a ſmall bony Ridge, which ends inſenſibly as it enters into the *Veſtibulum*.

As for the two Orifices which are at the lower Part of the *Veſtibulum*; the firſt, reckoning from the Top to the Bottom, is that of the *Canalis Inferior*, and that which is ſituated above it is the other Orifice of the *Canalis Medius*.

The Orifice which is in the Middle o the *Veſtibulum*, and which is the largeſt of them all, is that which is common to the ſuperior and inferior Canals. *See* Plate X. Fig. I, IX.

Explanation of Plate X.

Fig. I. *repreſents the temporal Bone twice as large as Nature; it is prepar'd in ſuch a manner that it ſhews the* Cochlea, *and the Semi-circular Canals in their natural Situations.*

Plate. X.

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Fig. I.

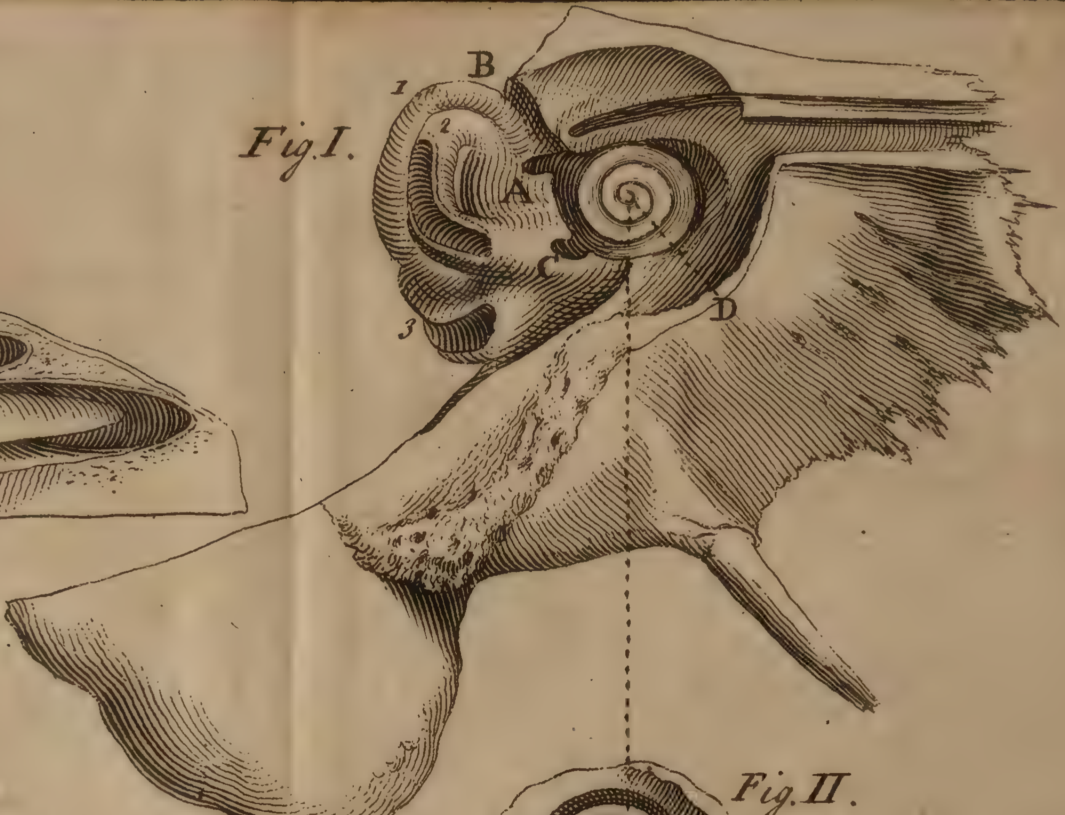


Fig. II.

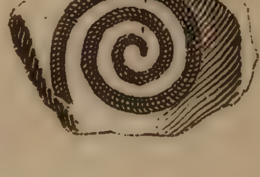


Fig. III.

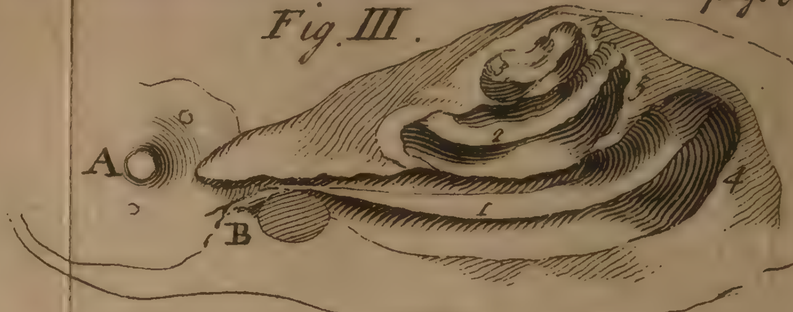


Fig. VI.

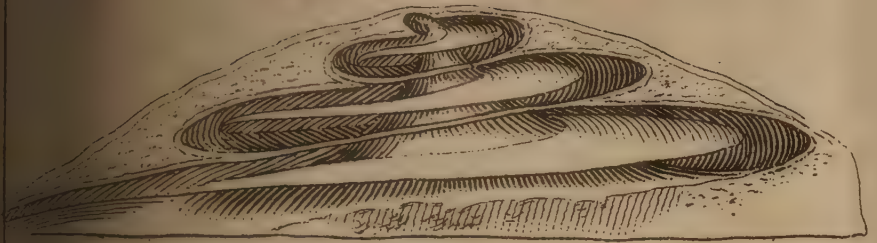


Fig. VII.

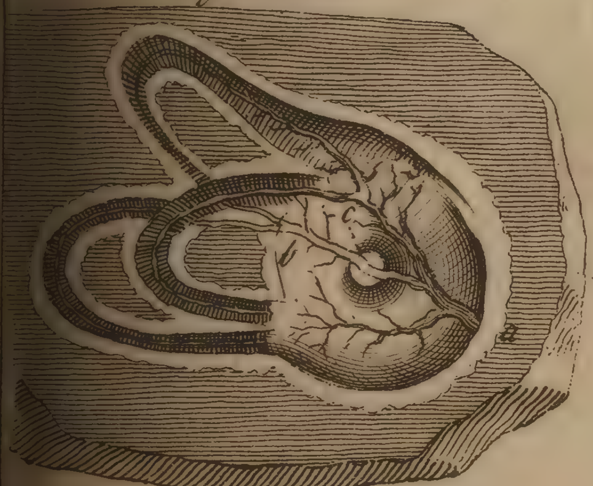


Fig. IV.

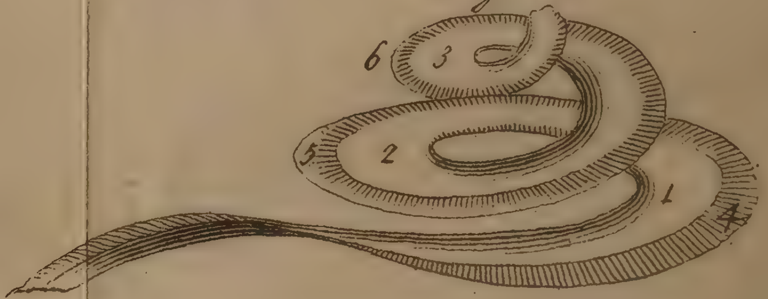


Fig. VIII.

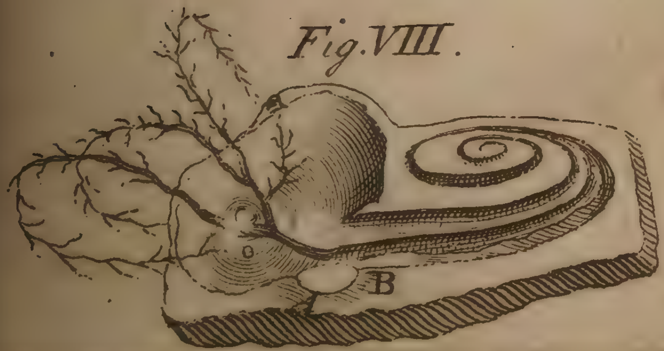


Fig. IX.

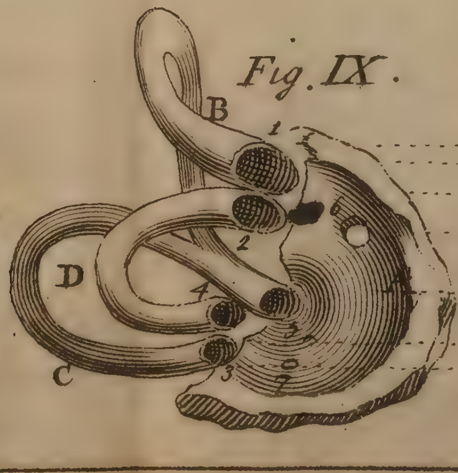


Fig. X.

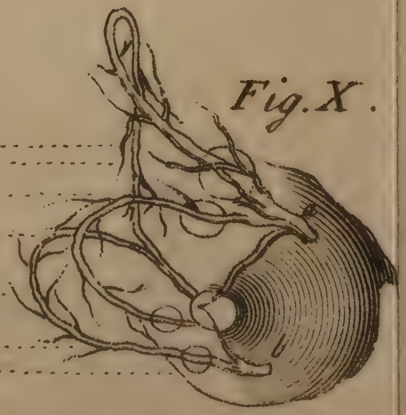
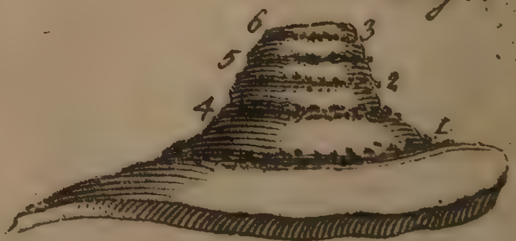


Fig. V.



B Cole Sculp

ation: A, *the Vault of the* Veſtibulum. B, *the* Feneſtra Ovalis, *mark'd by a punctur'd Line.* C, *the* Feneſtra Rotunda *open.* D, *the* Lamina Spiralis *mark'd by a punctur'd Line, diveſted of the ſpiral Canal which covers it, and of the Membrane which connects it to the Surface of this Canal.* 1, 2, 3, *the three Semi-circular Canals in their natural Situation.* 1. *the Superior.* 2, *the Middle.* 3. *the Inferior. The Middle, and the Inferior are open, to ſhew that they are hollow.*

Fig. II. *repreſents the Inſide of the Covering of the* Cochlea *taken off, to ſhew the Semi-oval Spiral Canal.*

Fig. III. *repreſents the Height of the* Cochlea *much larger than Nature, to ſhow it thus, The fore-part of its Covering only is taken off by a perpendicular Section: This ſhews how the* Lamina *makes two Turns and a Half round the Axis, how it is fix'd to the Surface of the Canal which ſerves as an Arch to it, and how the Sides of this Canal, which are connected to the Axis, become as thin as the* Lamina. A, *the inferior Portion of the* Veſtibulum, *which is put into this Figure, and only left to ſhew how the* Lamina Spiralis *proceeds out of its Cavity, and paſſes before the* Feneſtra Rotunda. B, *the* Feneſtra Rotunda *clos'd up* *by a thin Membrane, like the* Membrana Tympani. 1, 2, 3. *The two Circumvolutions and a half of the* Lamina Spiralis *round the Axis.* 4, 5, 6, *The two Turns and a half of the Spiral Canal.*

Fig. IV. *repreſents the* Lamina Spiralis *in the Air much larger than Nature, with the Membrane which connects it to the Surface of the Canal.* 1, 2, 3, *The* Lamina Spiralis. 4, 5, 6, *The Membrane which is fix'd to it, and which is diſtinguiſh'd from it by a Line, which is drawn between both.*

Fig. V. *repreſents the Axis much larger than Nature, upon which the Traces of the Circumvolutions of the* Lamina Spiralis, *and of the Spiral Canal are remarkable.* 1, 2, 3. *The Traces of the Windings of the* Lamina Spiralis, *which are perforated by a great many* Foraminula, *which afford a Paſſage to the Filaments of the auditory Nerve.* 4,5,6. *The Traces of the Side of the Spiral Canal.*

Fig. VI. *repreſents the* Cochlea *ſtanding, and half of it cut perpendicularly off, much like* Fig. III. *except that all the Bone is here taken away: This Figure is made for the better comprehending that third Figure, and for its Explanation it is ſufficient to remark, that the* Lamina *appears here diſengag'd from the Surface of the Canal, that it may ſhew the Inſide of this ſame Canal, and how its*

its Sides are elongated to be connected to the Axis.

Fig. VII. *repreſents the* Veſtibulum *and the three Semi-circular Canals open, to ſhew the Diſtribution of their Veſſels.* a, *the Branch of an Artery which enters into the* Veſtibulum. b, *a Ramification of this Artery, which paſſes through the common Orifice of the* Veſtibulum, *and which is diſtributed into the ſuperior and inferior Canals.* c, *the Ramification which furniſhes the middle Canal.*

Fig. VIII. *repreſents the Arteries of the* Cochlea, Veſtibulum, *and three Semi-circular Canals.* A, *the* Feneſtra Rotunda. B, *the Orifice of the Paſſage which gives Entrance to the Veſſels, which is at the Entrance of the* Scala Inferior *of the* Cochlea; *it ſhews that one Part of theſe Veſſels is diſtributed into the* Cochlea, *and the other into the* Veſtibulum, *and the three Semi-circular Canals; theſe laſt are repreſented as in the Air.*

Fig. IX. *repreſents a Portion of the* Veſtibulum *and the three Semi-circular Canals in the Air, to ſhew their natural Situation and their Orifices.* A, *the Inferior Portion of the* Veſtibulum. B, *the Superior Canal.* C, *the Inferior.* D, *the Middle.* 1, *the Orifice of the ſuperior*

Semi-circular Canal. 2, *the firſt Orifice* *the middle Canal.* 3, *the Orifice of th* *inferior Canal.* 4. *the other Orifice of th* *middle Canal.* 5, *the common Orifice to th* *ſuperior and inferior Canal.* 6, *the firſt* Fo ramen, *which affords an Entrance to one o* *the Branches of the* Portio Mollis. 7, *th* *ſecond* Foramen, *which affords an Entranc* *to another Branch of the ſame Nerve.*

Fig. X. *repreſents the* Veſtibulum, *i* *the ſame Diſpoſition as in the preceeding* *Figure, with the Nerves of the three Semicircular Canals in the Air.* a, *a Branc* *of a Nerve, which enters into the* Veſtibulum *by a* Foramen *mark'd* 6, *in* Fig. IX. *It is divided into three Branches, the firſ* *of which enters into the Orifice of the ſuperior* *Semi-circular Canal, the ſecond into the ſuperior Orifice of the middle Canal, and th* *third which is the leaſt deſcends to caſ* *itſelf into the common Orifice.* b, *the Branc* *which enters by the* Foramen, *mark'd* 7 *in* Fig. IX. *and is divided into two Ramifications, the Inferior of which enters int* *the Orifice of the inferior Canal, and th* *other advances into the common Orifice, an* *unites with the third Ramification of th* *Branch mark'd* a. *Theſe Nerves are repreſented ſomewhat larger than Nature.*

3dly, The Cochlea, *in which two Things are to be taken notice of,* viz.

On that Side of the *Veſtibulum* near the Face, oppoſite to the three Semi-circular Canals, we meet with the third Part of the Labyrinth, call'd the *Cochlea*, which s compos'd of two Parts, *viz.* Of a Semi-oval ſpiral Canal, and a *Lamina*, which runs ſpirally upwards. This *Lamina* follows the Courſe of the Canal, and ſeparates it into two.

1. *The Semi-oval Canal.*

This Semi-oval Canal is excavated out of the interior Part of the *Os Petroſum*, t covers the *Lamina Spiralis* in the Form of a Vault, and which makes a Dint in the Surface of this Bone, which advances forwards into the Inſide of the *Tympanum*, oppoſite to the *Membrana Tympani*: This Dint is elongated and terminates in a ſmall Ridge, which makes the Separation between the two *Feneſtræ*, as above-deſcribed. The Canal makes two Turns and a half round the Axis, diminiſhing and growing narrower as it proceeds upwards: Its Sides, which are fix'd to the Axis, diminiſh ſo much of their Thickneſs, the nearer they approach it, that they appear as thin as the *Lamina*.

2. *The* Lamina Spiralis.

The *Lamina Spiralis* ſeparates this Canal into two Parts, in which it is contain'd, being fix'd to the Axis by its *Baſis*, and by its other Extremity to the Surface

Which is fix'd to the Canal by a very fine Membrane,

of the Canal oppoſite to the Axis, by mean of a very fine Membrane, much thinne than the *Lamina*, and of a darker Colou which does not proceed in a plain *Superficies* like the *Lamina*, but turns a littl downwards. This Membrane, as it unfolds itſelf, lines the interior Part of thi Canal: It is eaſy to imagine, that in taking out the Axis from this Vault in th *Cochlea* which ſurrounds it, there muſt o Neceſſity appear four entire Rounds, an two half Rounds, *viz.* Two Rounds an a half of the Semi-oval Canal, and tw Rounds and a half of the *Lamina Spiralis* This *Lamina* is hard and brittle; its Baſis near the Axis is perforated with man oblique *Foraminula* in the ſame manner a the Axis is; the other Extremity of th *Lamina* is very thin, firm, and tenſe.

And which divides this Canal into two.

The Canal of the *Cochlea* being thu divided into two *Scalæ* or Ranges o Stairs in the *Cochlea*, built upon the ſam Axis, one above another, which have n Communication one with another, the have only two ſeparate Orifices, one o which forms an Entrance from the *Veſtiſtibulum* into the *Scala Superior* of th double Range; the other, which is th *Feneſtra Rotunda*, affords a Paſſage from the *Tympanum* into the *Scala Inferior*

See

ee Plate X. Fig. I, II, III, IV, V, nd VI.

And 3dly, The Arteries and Veins of the Cochlea,

There is an Orifice in the inferior Part f the *Os Petroſum*, below that through hich the auditory Nerve enters, which orms a Paſſage for an Artery and a Vein, hich are Branches of the internal Caotids and Jugulars: This is the Entrance f a Canal, which proceeding about the ength of a Line and a half, opens into he *Scala Inferior* of the *Cochlea*, near the *eneſtra Rotunda.* There Veſſels entring this Place divide themſelves into a great any Branches, which are diſtributed to he *Lamina Spiralis*, and to the Memrane that lines the Inſide of the Spiral anal. This Artery alſo in its Entrance rniſhes a conſiderable Branch to the *eſtibulum*, which as it enters is divided nto two Ramifications, one of which is xtended on the right Side, and the other n the left. Theſe two Ramifications re commonly ſubdivided again into two ore, one of which enters by the Orifice f the *Veſtibulum*, which is common to the perior and inferior Semi-circular Canals, d divides itſelf into two ſmall Filaents, which are diſtributed on the Inſide theſe Canals: the other Branch entring the ſuperior Orifice of the middle Canal,

And of the Veſtibulum.

nal, re-enters into the *Veſtibulum* by it other Orifice. Theſe Ramifications form *Anaſtomoſes* in many Places in the Inſid of the *Veſtibulum* : The Veins follow th ſame Courſe as the Arteries.

4thly, The implanted Air.

Since the two *Feneſtræ*, which ente into the Cavities of the Labyrinth, ar exactly ſtopt up, one by the Baſis of th *Stapes*, the other by its Membrane, it i eaſy from hence to conclude, that th Air which is confin'd in this Place ca have no Communication neither with tha in the *Tympanum*, nor conſequently wit the external Air; and this Air is tha without doubt which Anatomiſts hav term'd Implanted Air. *See* Plate X. Fig VII, *and* VIII.

The other Parts of the Organ *of* Hearing, *are the Canal of the auditory Nerve.*

The Canal through which the auditor Nerve paſſes is very large. It is form' out of the middle of the hinder Part o the *Os Petroſum* next the Brain, and proceeeding obliquely backwards about th Length of two Lines, it forms an impervious Paſſage, whoſe Bottom is partl terminated by the Baſis of the *Cochle* and partly by a Portion of the Arch o the *Veſtibulum* : At the Extremity of th impervious Paſſage there is a ſmall bon *Septum*, which ſeparates the Baſis of th *Axis* from the *Foramen*, through whic

th

the *Portio Dura* of the auditory Nerve paſſes.

Nervus Auditorius.

Is divided into two Branches, viz. The Portio Mollis.

The *Nervus Auditorius* ariſes from the poſterior Side of that Protuberance, which Modern Anatomiſts have call'd *Annular*, ıbout the Diſtance of a Line from a ſmall Lobule of the *Cerebellum*, which is fix'd to he Origin of this *Proceſſus Annularis*: This Nerve is compos'd of two Branches, he uppermoſt of which is the largeſt, and erm'd *Portio Mollis*, becauſe it is not nly in Reality more tender and ſoft than hat which accompanies it, but alſo than ll the other Nerves of the *Medulla oblonata*, except the Olfactory Nerves. The nferior Branch is called *Portio Dura*, not nly becauſe it is more fibrous and comact; but alſo becauſe it paſſes out of the *Cranium*, whereas the *Portio Mollis* loſes ſelf in the *Organs* of *Hearing*. Theſe two ranches run ſtrait and parallel as far as he *Foramen* of the *Os Petroſum*, proceedıg about the Length of three Lines; nd as ſoon as they enter into it, the *Portio Dura* paſſes above the other. It is at the ottom of this impervious Paſſage which e have already deſcrib'd, that the *Portio Mollis* is divided into three Branches; the moſt conſiderable of which being come to he Baſis of the *Axis*, ſeems to terminate and

The Portio Mollis *divided into three Branches; the largeſt of which is diſtributed into the* Axis *of the* Cochlea.

and be loſt in this Place: Whereas in reality it enters into thoſe above-mention'd oblique *Foraminula*, and is divided into many ſmall Filaments which are diſtributed to each Winding of the *Lamina* *Spiralis*. The Diviſion and Diſtribution of this Nerve may well be compared with that of the Olfactory Nerve, which being come to the Root of the Noſe ſeems to be terminated in this Place, and many Anatomiſts have believed that it really terminates here; but if they examine it ſtrictly, they would find the Nerve divided into ſmall Fibres, which are cover'd with the *Dura Mater*, paſſing thro' the ſmall *Foramina* of the *Os Cribroſum*, and entring into the Cavity of the Noſtrils, are diſtributed to the Membrane, which lines the *Laminæ* of the Noſe. *See* Plate XI. Fig. I, II, *and* III.

Explanation of Plate XI.

Fig. I. *repreſents the Baſis of the* Cerebrum *diveſted of all its Veſſels, to ſhew the* *Origin of the ten Pair of Nerves, which* *proceed from the* Medulla Oblongata; *al* *that Part of the Subſtance of the* Cerebrum, *which Mr.* Willis *call'd its Poſterior Lobes,* *is cut off*; i. e. *the Inciſion paſſes through*

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Plate XI.

Fig. I.

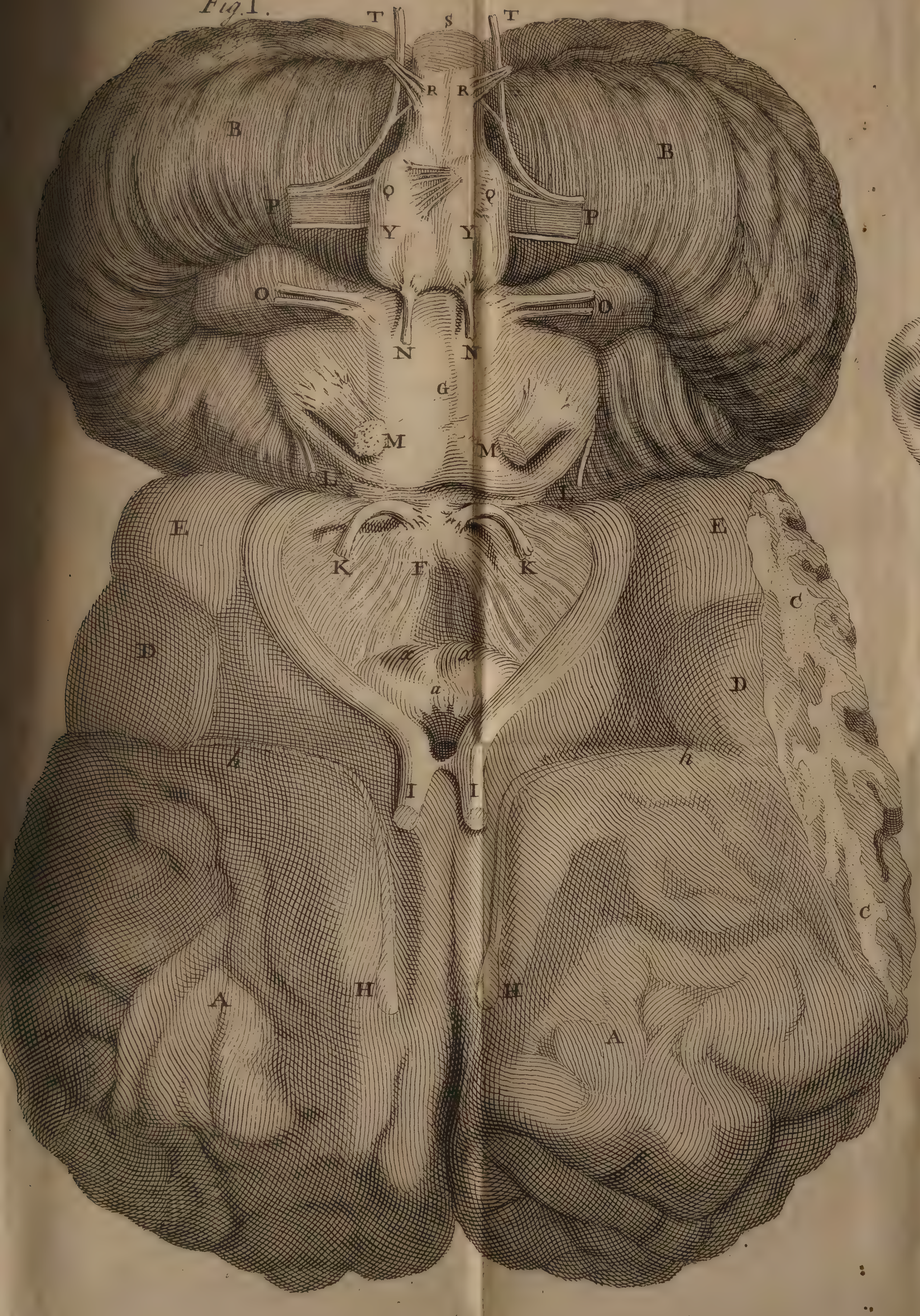
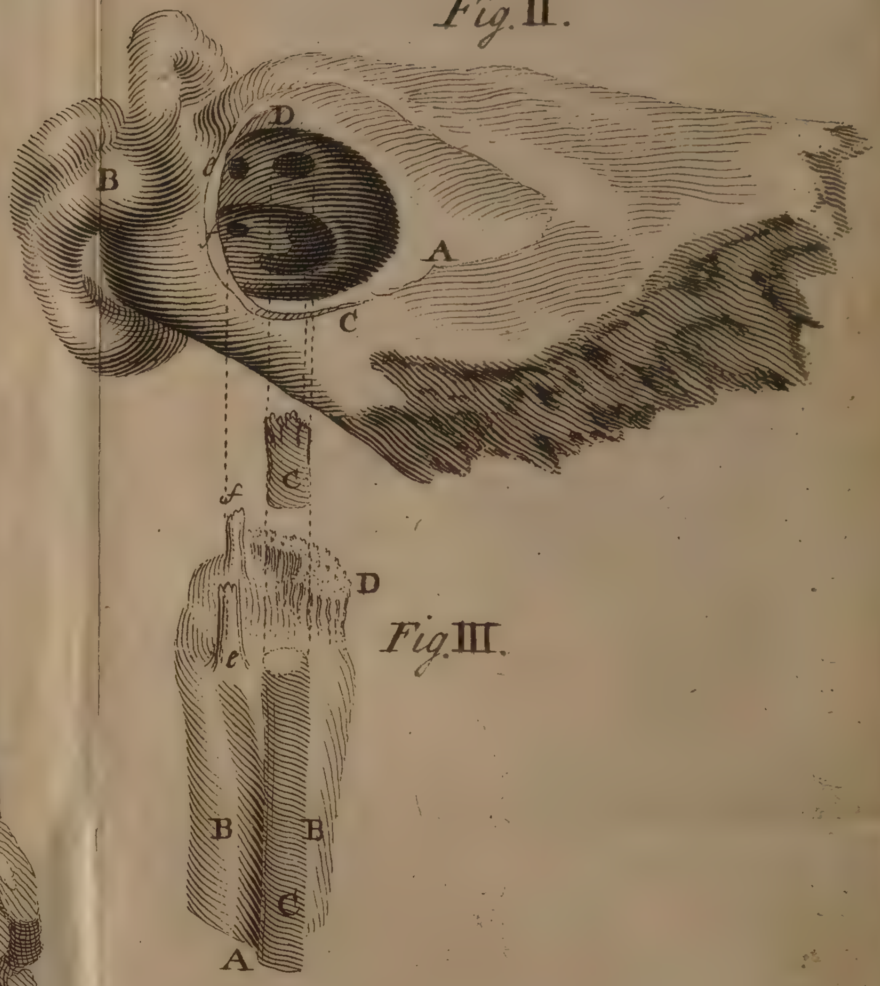


Fig. II.

Fig. III.



B. Cole, Sculp.

hat Place, where a great lateral Branch f the carotid Artery is ſent off upon the Subſtance of the Cerebrum, *into the Interſtice of its Lobes: This Inciſion ſerves to diſcover the true Origin of the firſt Nerves, and to place the* Cerebellum, *which in a revers'd Brain is always found ſupported by the poſterior Lobes, in the ſame* Superficies *as the* Cerebrum; *which is abſolutely neceſſary to ſhew the true Figure of the* Medulla Oblongata, *and the Origin of all the Nerves which proceed from it.* A A, *the fore-part of the* Cerebrum *revers'd.* B B, *the* Cerebellum. C C, *the Place where a Part of the* Cerebrum *has been cut off; this Cut is mark'd but on one Side, but we may ſuppoſe the ſame on the other.* D D, *the* Corpora Striata, *which are the Origins of the* Medulla Oblongata, *their poſterior Part is here ſhewn, and a Portion of them is cut off with the* Cerebrum. E E, *the* Nervorum Opticorum Thalami. F, *the* Medulla Oblongata, *whoſe two Branches are united in this Place, although Mr.* Willis *fancied they were divided.* G, *the* Proceſſus Annularis. H H, *the firſt Pair of Nerves, nam'd the Olfactory, which take their Origin from the Baſis of the* Corpora Striata, *by a medullary Fibre mark'd* h h, *and which increaſes in Bulk in the Place where*

where they wind about, near the optic Nerves. I I, *the optic Nerves, or the ſecond Pair of Nerves, which from their Origin from the* Thalami *are ſhewn as far as to their Exit out of the* Cranium. K K, *the third Pair of the Nerves, call'd* Oculorum Motorii. L L, *the fourth Pair of Nerves, call'd* Pathetici. M M, *the fifth Pair of Nerves.* N N, *the ſixth Pair of Nerves.* O O, *the auditory Nerves, which form the ſeventh Pair; they are divided from their Origin into two Branches, the largeſt of which, which is the uppermoſt, is the* Portio Mollis. P P, *the eighth Pair of Nerves, which proceed out of the* Medulla, *below the two Eminencies mark'd* y y. Q Q, *the ninth Pair of Nerves, which is mark'd but on one Side of the* Medulla, *and is even placed out of its Direction, for fear of rending the Figure puzzling, on the other Side we have contented ourſelves with ſhewing the Origin.* R R, *the tenth Pair of Nerves which proceed out of the* Medulla Oblongata, *which Mr.* Willis *has confounded with the firſt vertebral Pair.* S, *the* Medulla *cut off at its Entrance into the* Vertebræ. T T, *the two Nerves which proceed out of the* Medulla Spiralis, *in the Inſide of the Cavity of the* Vertebræ *of the Neck, and aſcend up into the* Cranium, *to*

be

e united to the eighth Pair of Nerves. u, *be* Infundibulum. x x, *two ſmall medul- ary Proceſſes, which Mr.* Willis *has taken or Glands.* y y, *two Eminences of the* ledulla *form'd in the Shape of Olives, which Mr.* Willis *has call'd* Corpora Py- amidalia. z z, *two ſmall Filaments of erves which proceed out of the* Medulla, *be united to thoſe Nerves which come from he Spine, and are join'd to the eighth Pair ; metimes two or three of theſe Filaments of erves are found on each Side.*

Fig. II. *repreſents the back-part of the* s Petroſum *much larger than Nature, nd as much of it taken off as was neceſſary diſcover the three Semi-circular Canals, nd the impervious Paſſage, which termi- ates the Canal of the auditory Nerve, and ſhew all the* Foramina *which we find ere.* A, *the Canal of the auditory Nerve ken off.* B, *the Semi-circular Canals.* , *the Baſis of the* Axis *of the* Cochlea, *erc'd by a great Number of ſmall* Fora- minula, *which give Entrance to the ner- us Filaments, which are diſtributed to all e Turnings of the* Lamina Spiralis. D, *e Entrance of the Canal which incloſes the* ortio Dura. e, *the* Foramen *which gives ntrance to the Branch mark'd* e *in* Fig. III. *another* Foramen *which gives Entrance to* *to the third Ramification of the* Portio Mollis, *mark'd* f, in Fig. III.

Fig. III. *repreſents the auditory Nerve much larger than Nature, which appears as if it were torn off from the* Os Petroſum, *to ſhew how it is divided at the Bottom of the Paſſage.* A, *the auditory Nerve divided into two Branches.* B B, *the* Portio Mollis. C C, *the* Portio Dura, *part of which is plac'd at the Top of the Figure, to ſhew the Filaments of one of the Branches of the* Portio Mollis; *the Trunk of the* Portio Dura *enters into the* Foramen *marked* D, *in* Fig. II. D, *a large Branch of the* Portio Mollis, *which is divided in a great many ſmall Filaments which enter into the* Foraminula, *which are ſituated at the Baſis of the* Axis *of the* Cochlea, *and are diſtributed to all the Circumvolutions of the* Lamina Spiralis. e, *another Branch of the* Portio Mollis, *which enters into the* Foramen, *mark'd* e, *in* Fig. II. f, *the third Branch of the* Portio Mollis, *which enters through the* Foramen, *mark'd* f, *in* Fig. II. *See the Diſtribution of theſe two laſt Branches in* Plate X. Fig. X. *the Branch* e, *is there mark'd by the Letter* a, *and the Branch* f, *by the Letter* b.

The two other Branches into the Veſtibulum.

The two other Ramifications of the
ortio *Mollis*, are for the uſe of the *Veſ-*
bulum. The moſt conſiderable of theſe
vo Branches run in at the Entrance of
ie Canal of the *Portio Dura*, and af-
rwards enters obliquely into a parti-
ular *Foramen*, which opens into the
rch of the *Veſtibulum* at the ſide of
ie Orifice of the ſuperior Canal of the
ochlea: This Ramification, as it enters,
rms a ſort of a Tuft, one Part of
hich proceeds into the Orifice of the
perior ſemi-circular Canal, and into
at of the anterior or middle Canal, join-
g them together, and partly ſhutting
em up; afterwards it furniſhes a ſmall
rvous Filament to each of theſe Canals,
ining it ſelf to an Artery which is di-
ributed to theſe Parts, and proceeding
ery where with it in the ſame Courſe;
e other Part of the Tuft is elongated
the bottom of the *Veſtibulum*, and
roduces a ſmall Twig, which enters into
e common Orifice.

And into the Semi-circular Canals.

The ſecond Branch of the *Portio Mol-*
, which is deſtin'd for the uſe of the
ſtibulum, enters into a very oblique
ramen, which opens a little below the
ove deſcrib'd Branch: This Nerve at
entrance into the *Veſtibulum*, is di-

vided into two ſmall Twigs; one which enters into the Orifice of the i ferior Canal, which is ſituated at t bottom of the *Veſtibulum*, and the oth aſcends towards the common Orifice. A theſe ſmall Ramifications of Nerves, ha a Communication with one another. S Plate X. Fig. X.

The Portio Dura,

The *Portio Dura* enters into a *For* *men*, ſituated near the upper Part the *Fundus* of that impervious Paſſag which we have already deſcrib'd. Th *Foramen* is the entrance of the bony Cana which is form'd out of the *Os Petroſum* running obliquely towards the *Tympanum* into which it does not penetrate, but o ly inſinuates it ſelf into the Surface the *Os Petroſum*, which makes one of th *Parietes* of the *Tympanum*. This Can proceeding down to the Top, and by th Side of the *Feneſtra Ovalis*, and to th upper Part of the little Canal, which i cloſes the *Muſculus Stapedis*, deſcends y lower; and having proceeded about tw lines and an half, being all along c ver'd by the *Os Petroſum*, it paſſes ou thro' a *Foramen*, which is between th *Maſtoid* and *Styloid Proceſſes*. Th Nerve before it protrudes out of its *For* *men*, receives a Ramification from

Nerv

erve of the fifth Pair, which paſſes be- nd the *Membrana Tympani*, which we all deſcribe in the Sequel. This ſame *ortio Dura* at its Exit out of the *Fora- en*, furniſhes a Ramification, which aſ- nding towards the back part of the ar, is expanded over all the Parts of e exterior Ear, and near the *Proceſſus ammillaris.* It furniſhes many other ranches which are diſtributed to other arts, of which we ſhall treat at the End this Deſcription. *See* Plate XI. Fig. Plate XII. Fig. I, II, and III.

Which produces as it paſſes out of the Cranium, *a Ramification which is expanded over the back part of the Ear.*

Explanation of Plate XII.

Fig. I. *repreſents the Surface of the* Os etroſum, *twice as large as Nature, to ew the bony Canal, thro' which the* ortio Dura *paſſes, and that thro' which* eChorda Tympani *deſcends to be join'd to e* Portio Dura. A, *the* Proceſſus Mam- illaris. B, C, *the bony Canal which is the* Tympanum. C, D, *part of the ne Canal which is ſituated without the* ympanum, *and which is excavated out the* Os Petroſum. *Its Extremity lies tween the* Proceſſus Mammillaris *and* yloides. E, *the little Canal of the* Os etroſum, *thro' which the ſmall Nerve of the*

the Tympanum *paſſes to be join'd to t* Portio Dura.

Fig. II. *repreſents the* Portio Du *bare, extracted from its Canal, with t* *little* Chorda *which croſſes the* Tympanum A, B, *part of the* Portio Dura, *whi* *is incloſ'd in the* Tympanum. B, C, *pa* *of the* Portio Dura, *which is conceal'd* *the* Os Petroſum. D, E, *that part of t* Chorda *which croſſes the* Tympanum E, F, *part of the ſame* Chorda, *whi* *paſſing out of the* Tympanum, *hides it* *in the little Canal, mark'd* E, *in the fi* *Figure of this Plate, and which is join'd* *the* Portio Dura. F, *the place where t* *little Nerve joins with the* Portio Dura.

Fig. III. *repreſents the Ear revers* *to ſhow the Ramification of the* Por Dura, *which is diſtributed upon it.* *the Ear revers'd.* B, *the* Proceſſ Mammillaris. C, *the Trunk of the* P tio Dura, *paſſing out of the* Os Petroſu D, D, *the firſt Ramification of this Ner* *which aſcends up the back Part of* *Ear, and diſtributes a great many* *laments to it, and to the* Proceſſus Ma millaris. E, *the Diviſion of the* Por Dura *into two Branches.* F, *the ſuper* *Branch.* G, *the inferior Branch.*

T

The Chorda Tympani, *is a Nerve which is a Branch of the fifth Pair.*

The little Nerve which croſſes the *Tympanum*, takes its Origin immediately rom a Branch of the fifth Pair, which proceeding downwards, is diſtributed on he Side of the Tongue ; afterwards this Nerve reaſcends up to the exterior Side of he bony Canal of the Aqueduct, and ollowing the Courſe of the external Muſcle of the *Malleus*, upon which it s plac'd, it enters into the *Tympanum* through the ſame *Foramen* ; afterwards it repaſſes under the Tendon of the nternal Muſcle, and deſcending oblique-y backwards, it leans upon the *Mem-rana Tympani*, and paſſing before the ong Branch of the *Incus*, it comes out f the *Tympanum*, running into a ſmall Canal, which is form'd out of the *Os Pe-roſum*, and joins to the Trunk of the *Portio Dura*, a little before the *Portio Dura* is protruded out of its Canal. It s this ſmall Thread of a Nerve, which Anatomiſts have conſider'd as the *Chor-a Membranæ Tympani*, and which they ancied might cauſe ſome Sound in com-unicating its Agitations to this *Mem-rane*, in the ſame manner as a Cord oes, which they put upon a Skin of a Drum. But although it is true, that is *Chorda* touches the *Membrana Tym-*

Which is join'd to the Trunk of the Portio Dura.

pani, if we but examine its Structure, w
ſhall ſoon diſcover its Uſe. For beſid
its Origin, which plainly makes it appe
that it is a Nerve, its diſtribution leav
no room to doubt of it ; there being n
Nerve, which is diſtributed either to th
Muſcles or the *Oſſicula*, or to the oth
Parts which are contain'd in the *Tymp*
num. See Plate VII. Fig. I, *and* II. Pla
XIII. Fig. I. *and* Plate XII. Fig. I, *and* I

Explanation of Plate XIII.

This repreſents the whole temporal Bo
as large as Nature, ſomewhat revers'd, an
the under Part ſhewn, with the Branch
the fifth Pair of Nerves, which is diſtr
buted to the lower Jaw, to ſhew the Orig
and Courſe of that ſmall Twig of a Nerv
which is call'd the Chorda Tympani, *an*
the diſtribution of another Ramification of th
ſame Nerve, which goes to the external E

A, *the ſcaly Part of the temporal Bo*
B, *the* Proceſſus Mammillaris. C, *t*
Proceſſus Styloides. D, *the* Zygom
ticus. E, *the Paſſage which goes from t*
Ear to the Palate. F, *the Branch of t*
fifth Pair call'd the inferior maxilla
Nerve, becauſe it is particularly diſtribu
to the lower Jaw, and to the Part wh

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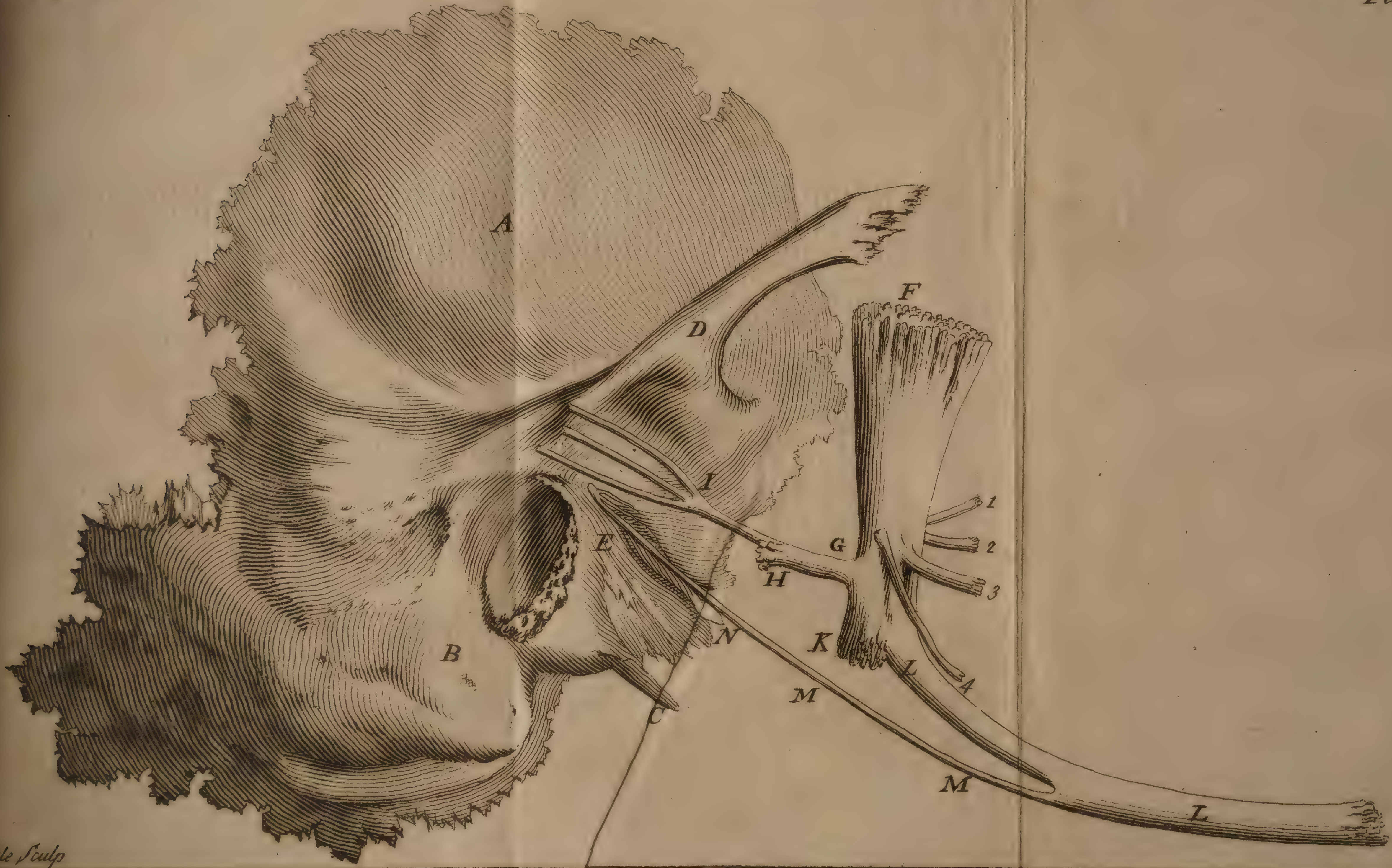
Plate XIII



B Cole Sculp

ſurrounds it. 1, 2, 3, 4. *Four Ramifications that this Branch furniſhes immediately after its Exit from the* Cranium, *the* 1. *of which goes to the temporal Muſcle.* 2. *to the external Maſſeter.* 3, *to the* Buccinator, *and to the Glands of the Cheek.* 4. *to the* Pterygoideus internus. G, *another Ramification which it alſo ſends off at its exit.* H, *a Branch of this Ramification, which goes to join the Ramification of the* Portio Dura, *mark'd* 6, *in the* XVIth *Plate.* I, *the Diſtribution of the Ramification* G, *to the external Ear, the Branches of which are cut off.* K, *the Branch which enters into the lower Jaw cut off.* L, L, *the Branch which goes to be diſtributed to the Sides of the Tongue.* M, M, *a Ramification of this Branch which aſcends over the bony Part of the Paſſage of the Aqueduct, and enters into the* Tympanum; *and this is what is call'd the* Chorda Tympani. N, *the external Muſcle of the* Malleus *in its Situation.*

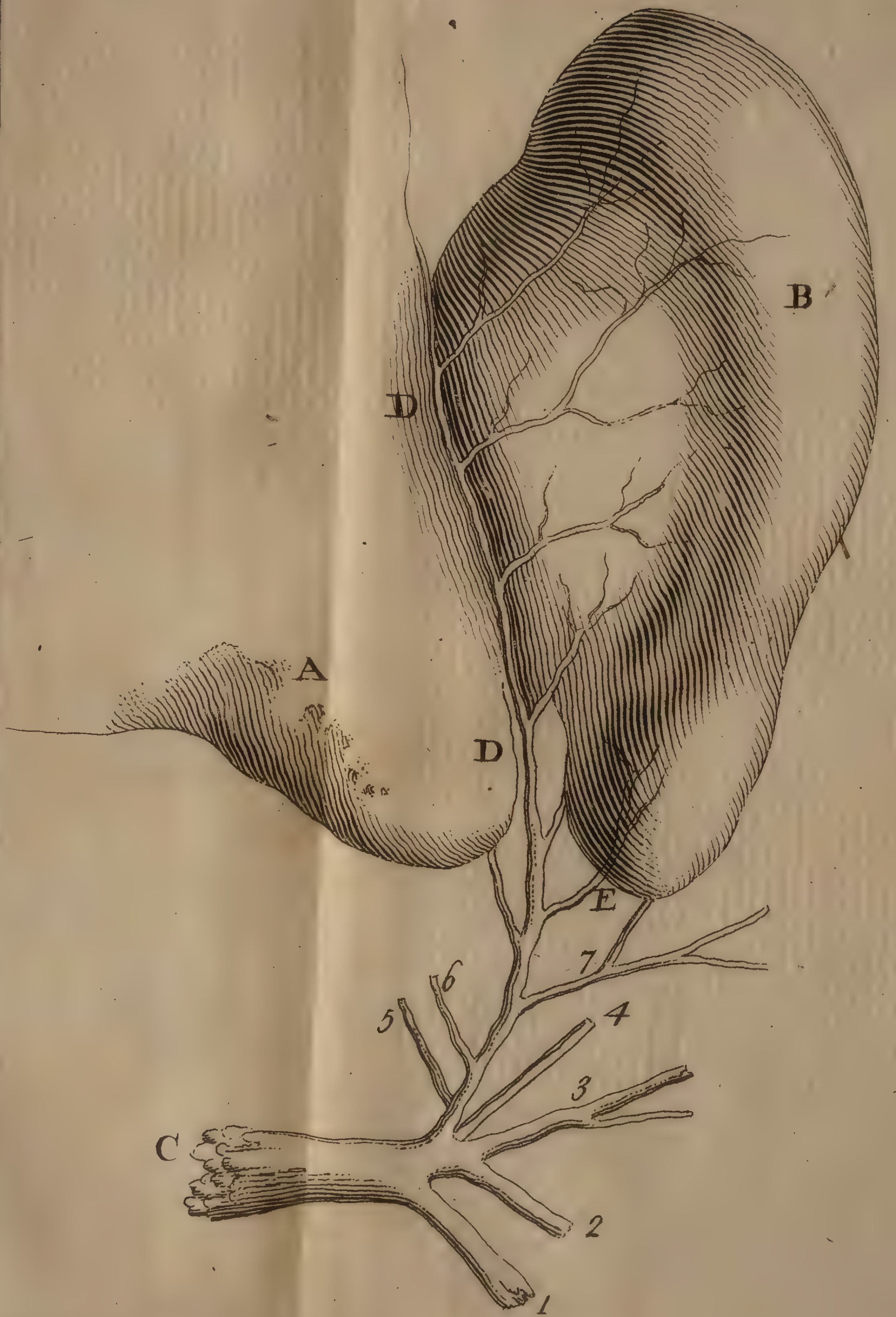
The ſecond vertebral Pair, furniſhes a Branch to the Ear.

Laſtly, The ſecond vertebral Pair ſends forth a conſiderable Branch, which goes up to the Ear: It creeps under the Skin, the Length of the *Muſculus Maſtoideus*, and of the parotid Gland, and parts into three Branches near the Ear, one of which is expanded upon the back Par and upon the End of the Ear, and th third diſtributes its Fibres into the cartilaginous Paſſage.

It is here proper to take notice, tha Mr. *Willis* makes this Branch of a Nerv proceed from the firſt vertebral Pair The Reaſon of this is, that he ſuppoſe that the tenth Pair of the Nerves of th *Medulla Oblongata* paſſes out no where el but between the firſt and ſecond *Vertebræ* and ſo he reckons for the firſt Pair o the *Medulla Spinalis*, that which iſſue out into the *Interſtitiæ* of the ſecond an third *Vertebræ*: But the Reaſon o this Error proceeds from his not knowing the Egreſs of the tenth Pair, whic he has confounded with the firſt vertebral Pair; tho', theſe two Nerve have different Origins, Exits, and Diſtributions. *See* Plate XIV. Fig. I.

Explanation of Plate XIV.

A, *the* Proceſſus Mammillaris. B, *the back Part of the Ear.* C, *the Trun of the ſecond vertebral Pair.* 1, 2, 3, 4, 5, 6, 7. *Many Branches cut off, tha this Nerve ſends to the neighbouring Muſcles, and to the vertebral Nerves.* D, D



B. Cole. Sculp.

the Branch of this Nerve, which aſcends up to the external Ear. E, *the Branch which is loſt in the Lobe of the Ear, and in the cartilaginous Paſſage.*

There are many particular Things in the Ear of a Fœtus.

After having explain'd the Structure of the Ear, in Subjects of eighteen or twenty Years old, we thought it neceſſary to take notice, in what it differs from the Ear of a *Fœtus.*

1. *That Part of the auditory Paſſage, which is bony in Adults, is nothing but a Membrane in the* Fœtus.

1. The bony Canal of the auditory Paſſage is, in the *Fœtus*, nothing but a pretty hard Membrane, join'd by one of its Extremities to the cartilaginous Paſſage, and by the other it adheres to the *Membrana Tympani*, by the help of a Groove in the bony Circle, which we re going to deſcribe: This Paſſage, which in Adults is about five or ſix Lines ong, is not above a Line and a half in ength; and what appears to us of it, is eally nothing elſe but what ſerves to form hat part of the Canal, which grows flat owards the *Fundus. See* Plate XV. Fig. I.

Explanation of Plate XV. which repreſents many Parts of the Ear of a *Fœtus.*

Fig. I. *repreſents the Ear of a Child e Year old.* A, *the upper Part of the Ear.*

Ear. B, *its cartilaginous Paſſage.* C *the Membrane which connects the cartil ginous Paſſage to the bony Ring, and whi indurates afterwards to form the beginnin of the bony Paſſage of the Ear.* D, *th bony Ring.* E, *the* Proceſſus Zygomati cus.

Fig. II. *repreſents the forepart of th temporal Bone of a* Fœtus. A, *the ſca Part, whoſe ſmall bony Fibres are eaſi diſtinguiſh'd, as they are alſo in all the ther Bones which compoſe the* Cranium *a* Fœtus. 2, 3, *the Sides of its Circum ference, which are yet Cartilaginons.* *the* Proceſſus Zygomaticus. C, *th* Membrana Tympani. D, *the bony Rin which receives the* Membrana Tympan E, *the* Proceſſus Styloides, *which is as y cartilaginous.* F, *the* Proceſſus Mam millaris, *which is yet very ſmall.* 4, *th* Foramen, *thro' which the* Portio Du *paſſes out.* G, *this Letter marks an o ſcure Line, which is the Place where th ſcaly Part is ſeparated from the* Proceſſ Mammillaris; *theſe two bony Pieces a exactly united in Adults.* H, *the Can which incloſes the internal* Carotid. *the* Foramen *where the Tube which g from the Ear to the Palate is connected.*

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Plate XV.

Fig. 2.

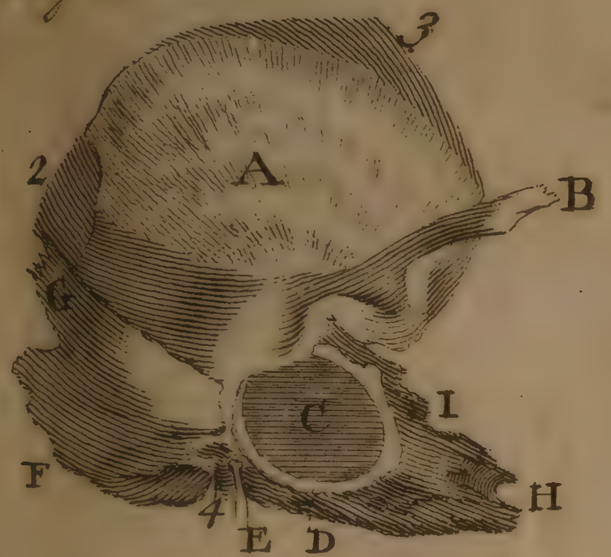


Fig. 3.

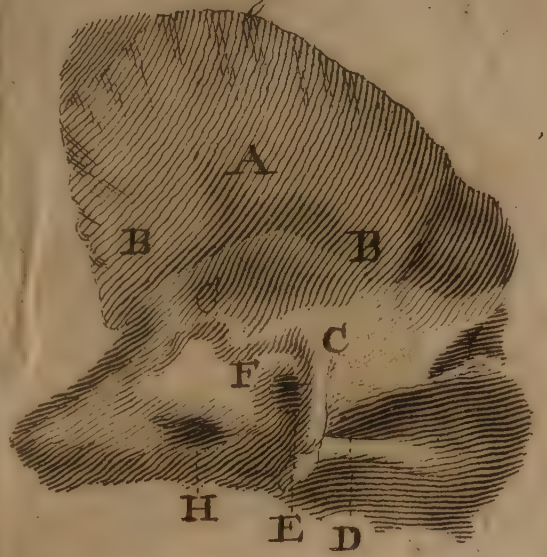


Fig. 5.

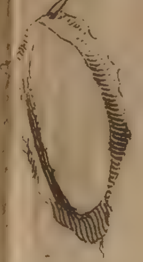


Fig. 4.

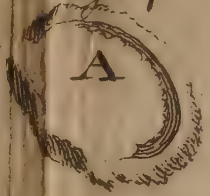


Fig. 6.

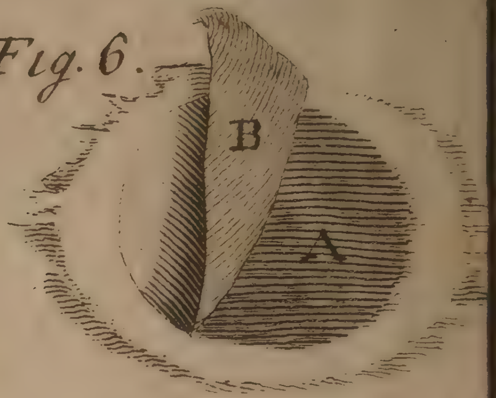
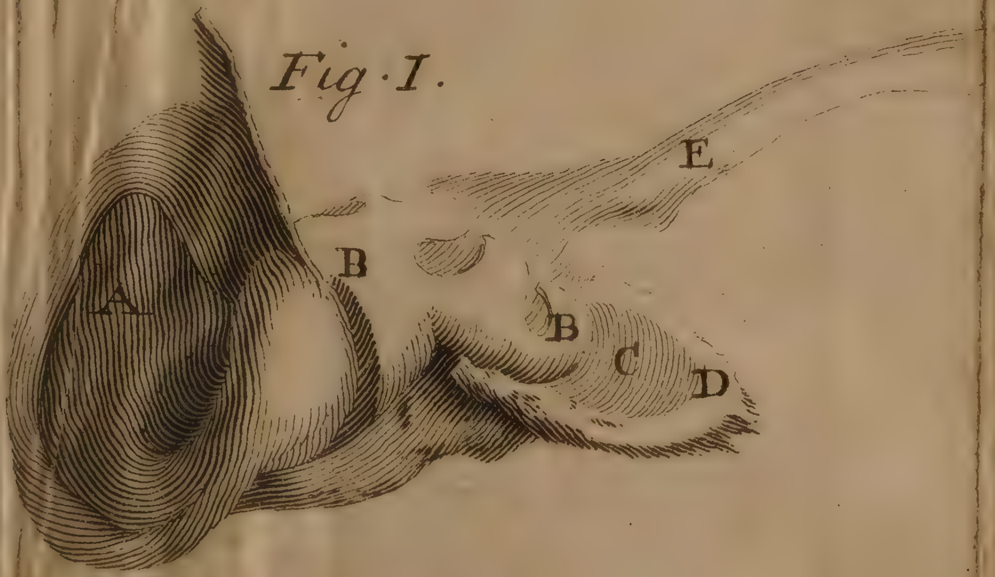


Fig. 1.



B Cole Sculp

Fig. III. *repreſents the back part of the temporal Bone.* A, *the ſcaly Part.* B, B, *the Place where it ſeparates from the reſt of the* Os Petroſum. C, *the ſuperior Semicircular Canal, which is ſeen without any Preparation.* D, *the Inferior.* E, *the Place of their Communication.* F, *A conſiderable* Foſſa, *which is ſituated under the ſuperior Canal, and which is fill'd up and effaced as the* Fœtus *grows older.* G, *a* Foramen, *which is in the Paſſage of the* Portio Dura. H, *the* Foramen *of the auditory Nerve.*

Fig. IV. *repreſents the bony Ring, leaning a little to ſhew the Groove.* A, *the bony Ring leaning on one Side.*

Fig. V. *repreſents the ſame Ring, leaning in another manner, to ſhew the reſt of its Groove.*

Fig. VI. *repreſents the* Membrana Tympani, *twice as large as Nature, half of it diſcover'd from a Membrane, which covers it.* A, *the* Membrana Tympani. B, *a mucilaginous Matter indurated into a Membrane which covers it in the* Fœtus.

2. *There is a Circle.* In the *Fœtus*, we find a Circle which is plac'd exactly above the Entrance of he *Tympanum:* this Circle is eaſily ſeparated from the *Os Temporum*; and may plainly be ſeen with the *Membrana Tym-*

pani, when the Ear and auditory Paſſage is remov'd.

Which is not entire.

This Circle is broke off about half a Line in its upper Part, near the Place where the Head of the *Malleus*, and the maſſy Part of the *Incus*, are conceal'd in the *Tympanum*; this interruption is found in Adults, as we have ſaid before, and in this Place the *Membrana Tympani* is directly fix'd to the Edge of the Extremities of the bony Canal, belonging to the external Ear.

It is hollow in the Inſide like a Gutter.

In the Inſide of this Circle, there is a ſmall Cavity, which runs hollow through its whole Circumference, which forms the above-mention'd Groove, in which the *Membrana Tympani* is inchas'd. We muſt alſo take notice of a ſmall Sinuoſity in its ſuperior Part, upon which the external Muſcle of the *Malleus* runs: This Sinuoſity is alſo found in Adults.

This Circle is united to the bony Canal in Adults.

Although this ſmall Circle is eaſily diſtinguiſh'd, and ſeparated in new-born Infants, yet it diſappears in Adults, and forming but one Body with the bony Canal, it is impoſſible to ſeparate it. One may diſtinguiſh it in Children of three or four Years old, but it is ſo ſtrongly fix'd to the temporal Bone, that it is not to be ſeparated from it. We muſt take notice

that

hat it begins to join by its two Extremities, and inſenſibly through the reſt f its circumference.

It has the ſame Plan, both in the Fœtus *as in the* Adult.

× [illegible]

There is no room to doubt, but that he Groove into which the *Membrana Tympani* is fix'd,× is the ſame as the Cavity in the bony Circle, ſince the *Membrana Tympani* has conſtantly the ſame Situation, and the ſame Plan in the *Fœtus*, which it has in the Adult. *See* Plate XV. Fig. IV.

3. *The* Aqueduct *almoſt entirely* Membranous.

3. The Paſſage which goes from the Ear to the Palate, which in Adults is partly bony, and partly cartilaginous, is almoſt entirely membranous in the *Fœtus*, and its bony Part becomes inſenſibly oſſified, as the *Fœtus* advances in Age, in much the ſame manner as the bony Canal of the auditory Paſſage does.

4. *The* Membrana Tympani *is cover'd with a mucilaginous Matter.*

4. During the Time, the *Fœtus* remains in the *Uterus*, the *Membrana Tympani* is cover'd with a mucilaginous Matter, which indurates into a *Membrane*, but afterwards it diſappears. *See* Plate XV. Fig. VI.

Beſides theſe, in the poſterior Part of the *Os Petroſum*, there are ſome pretty remarkable Differences to be ſeen.

5thly, The ſuperior Semi-circular Ca-

The *Canalis ſemi-circularis Superior* of the *Labyrinth*, may be diſtinguiſhed and *nal, and a Portion of the Inferior are viſible, without any Diſſection.*

and ſeen almoſt without any Preparatio
as may alſo a Portion of the *Cana*
Semicircularis Inferior, at the Place whe
it communicates with the inferior.

6thly, *There is a* Foſſa *and a* Foramen, *in the* Os Petroſum.

2. Under the ſuperior Canal, there i
a conſiderable *Foſſa* to be ſeen, whic
diſappears as the Child grows older: An
there is beſides, a *Foramen* in the uppe
Part of the *Os Petroſum*, and in the Pa
ſage of the *Portio Dura*, which is ver
remarkable in the *Fœtus*, and which i
alſo found in People of a very advanc'
Age, but is much more minute in them

7thly, *The ſcaly Part of the temporal Bone is ſeparable from the* Proceſſus Mammillaris, *which is very minute.*

3. The ſcaly Part of the *Os Temporum*
is ſeparated from the *Os Petroſum*, th
Proceſſus Mammiformis is very ſmall. A
for the other Parts of the Ear, there i
no remarkable Difference between them
See Plate XV. Fig. I, II, *and* III.

8thly, *The* Oſſicula, *and the* Labyrinth *are of pretty nigh the ſame Size, in the* Adult, *and in the* Fœtus.

We ſhall here take notice, that th
ſmall Bones of the Ear, the Semi-circular Canals, and the *Cochlea* are of th
ſame Form, and very near of the ſam
Size, in new-born Children, as they ar
in *Adults*: So that Age ſerves only t
ſtrengthen and render them firmer.

The Trunk of the Portio Dura, *has two principal*

To finiſh this Deſcription, there remains nothing to be taken notice of, bu
ſome other Ramifications which the *Porti*
Dura ſends forth. After it hath furniſh'd a

Branch which goes to the Ear, it proceeds about the Length of four or five Lines without any Diviſion; after this, it is divided into two conſiderable Branches, the Superior of which is many times divided and reunited, as it aſcends over the Maſſeter Muſcle, and croſſing the Parotid Gland, at laſt forming a Figure like a Gooſe's Foot, it is commonly ſubdivided into ſeven other Ramifications; the firſt five of which aſcend obliquely, and are diſtributed to the Muſcles of the Forehead, the Temples and Eye-lids. Some of theſe Ramifications being ſpread over the *Os Malæ*, paſs through particular *Foramina*, into the *Orbit*: The ſixth Branch paſſing over the middle of the Maſſeter Muſcle, receives a conſiderable Branch from the fifth Pair, which we ſhall afterwards deſcribe; it furniſhes ſome Branches which accompany the ſalivary Duct, and which embrace it in many places, and it is ſubdivided upon the Middle of the Cheek, into a great Number of ſmall Filaments, which are diſtributed to the Muſcles of the Noſe, and upper Lip. The Seventh is deſtin'd for the Uſe of the Muſcles of the lower Lip. Laſtly, many Ramifications

Branches, which are divided into many Ramifications.

The Ramifications of the firſt Branch, are diſtributed to the Muſcles of the Forehead, Temples, and Eyelids.

And paſs into the Orbit.

They alſo go to the Muſcles of the Noſe and Lips.

And to all Integuments of the Face.

cations of all theſe Branches, are loſt the outward Integuments of the Face.

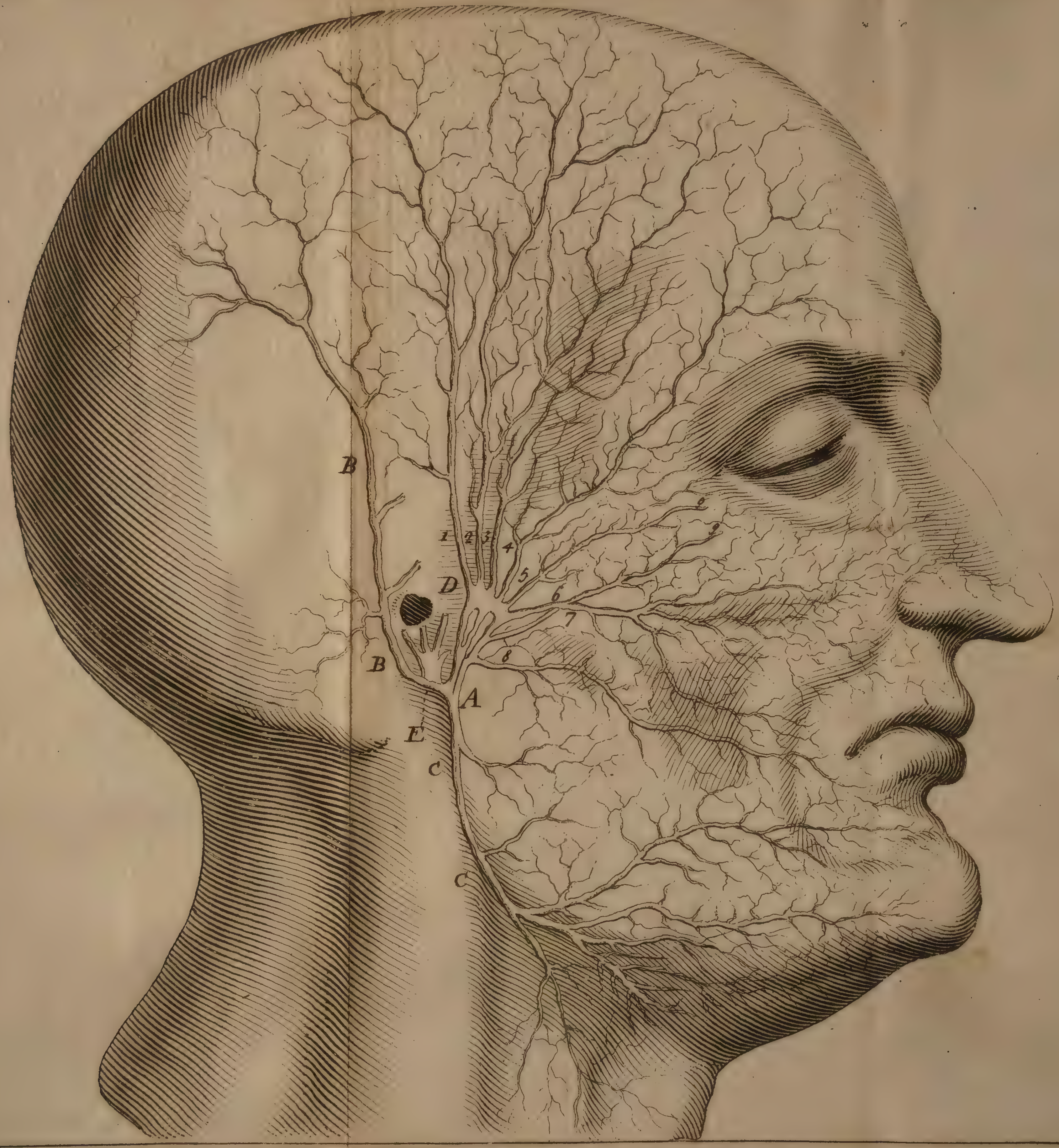
The Ramifications of the ſecond Branch are diſtributed to the Muſcles which are under the Jaw.

The inferior Branch proceeds dow wards under the Angle of the Jaw, an is divided into many little Twigs, whic are diſtributed to the Muſcles that ar cover'd by the Jaw. *See* Plate XV Fig. I.

Explanation of Plate XVI.

It repreſents the Portio Dura, *in th different Parts of the Face.* A, *the Trun of the* Portio Dura, *which proceeds out the* Cranium *thro' the* Foramen, *which between the* Proceſſus Mammillaris *an* Styloides. B, B, *a large Ramification which it furniſhes to the external Ear, ſom Branches of which are cut off, which appear whole in* Fig. III. Plate XII. C, C, *the inferior Branch which is diſtributed t the Chin, to the Muſcles, which are ſituated under the Jaw, and to the Integuments* D, *the ſuperior Branch, which immediately divides into the Shape of a Gooſe's Foot* 1, 2, 3, 4, 5, *five Ramifications of thi Diviſion, which are diſtributed to the Muſcles of the Temples, Forehead, and Eyelids* 6, *the Ramification of this Diviſion, which expands it ſelf over the Middle of the Cheeks*

an



B. Cole Sculp.

d which is enlarg'd by the Branch of the th Pair, mark'd 7, 8, *the laſt Rami- ation of this Diviſion, which furniſhes wigs to the* Muſculus Buccinator, *and to oſe of the Lips.* 9, 9, *two ſmall Fila- ents, which appear as if they were cut f, becauſe they ſink into the* Orbit *thro' rticular* Foramina, *which are in the* Os alæ. *All theſe Ramifications furniſh a ry great Number of Filaments to all the In- guments of the Face, we muſt ſuppoſe them t off in taking off the Integuments.* E, *the ranch of the fifth Pair, mark'd* G *in the* late XIII, *from whence a ſmall Branch.* , *paſſes out, which is united to the Ramifi- tion,* 6, *of the* Portio Dura. *The other ranches being cut off, which are diſtributed the external Ear, and to its Paſſage, may ſeen in the ſame Plate,* i. e. *the* XIII.

One of the Ramifications from the runk of the fifth Pair call'd the *Maxil- ry*, immediately at its Egreſs out of the *ranium*, ſends off many Branches, one of hich paſſing under the *Proceſſus Condy- ides* of the Jaw, advances forwards, and cending above the Jaw, very nigh the lace of its Articulation, ſends forth a ilament, which paſſes over the Maſſeter uſcle, and is united to that Branch of

The fifth Pair furniſhes a Branch to the Portio Dura.

the *Portio Dura*, which ſpreads it ſelf
ver the middle of the Cheek. All
reſt of this Branch is divided into ma
Ramifications, which are diſtributed
the cartilaginous Paſſage, to the E
and to the parotid Gland. Someti
this Communication is made by a doub
Branch. Mr. *Willis* and all the mode
Anatomiſts after him, have advanc'd t
the eighth Pair furniſhes a Branch, wh
is join'd to the Trunk of the *Portio Du*
at its Egreſs out of its *Foramen*: I ha
examin'd many Subjects in hopes of fi
ing this Branch, but never could m
with it; and I can ſcarce believe M
Willis has ever ſeen it but in Brutes, wh
this Communication is always to
found, and is form'd before the *Por*
Dura proceeds out of its Canal.

End of the Firſt Part.

OF THE ORGAN OF HEARING.

PART II.

Containing the Uſe of the Parts of the Ear.

AFTER having given a pretty exact Deſcription of all the Parts of the Ear, to render this Treatiſe more uſeful, I thought my ſelf obig'd to accompany it with ſome Reflections, and to draw from the Mechaniſm

The Mechanical Structure of the Organs of Hearing, ſerve to diſcover the Uſe of them.

niſm of theſe Parts, ſome Conſequen by which we may be able to explain th Uſe, and the Manner by which we a made ſenſible of different Sounds an Noiſes. As it is a very important Su ject, and appear'd to me to be very ni and difficult, I wou'd not truſt entir to my own Judgment, and I confeſs th I am oblig'd to Mr. *Mariote* for a gre Part of what will here be found curiou neverthelefs, I muſt not expect that wh I am going to treat of, will be well r ceiv'd by every body. My Conjectu appear probable to me, but other Pe ple may be of a different Opinion. How ever it happens, I ſhall think I have ſu ceeded very well; if by this Eſſay I ma induce them to give us ſomething bett

The external Ear performs the Office of the Trumpet, which deaf People make uſe of.

I ſhall follow the ſame Order that I d in my Deſcription, and therefore I co ſider the external Ear as a natural Trum pet, whoſe neat and ſmooth Cavity ſerv to amaſs the Sound, and conſequent renders its Impreſſion ſtronger upon t other Organs of Hearing. Experien favours this Opinion, in that, thoſe Pe ple who have their Ears cut off, can hear ſo well, and are oblig'd to mak Uſe of the Palm of their Hand, or of ſpeaking Trumpet to ſupply this Defect

ar

d alſo for this Reaſon, Brutes, as Deer d Hares, always turn their Ears that ay from which the Noiſe comes, that ey may hear the better. Some ſay that e directions of Sound, inſinuating emſelves into the Folds of the Ear, ere form many Refractions before ey come to the *Concha*, and that theſe peated Refractions ſerve to increaſe the mpreſſion upon the other Organs; as it appens in a Semi-circular Vault, that e Rays of the Sound being refracted equal Angles, the Length of the Cirumference of the Vault, at laſt paſs om one end to the other, by many reat and ſmall Refractions.

Its Folds ſerve to augment the Force of the Air, which acts upon the Organs by the Refractions which they cauſe.

The Motion of the Muſcles of the exernal Ear, is very obſcure; but they eem to be deſign'd for the Contraction nd Dilatation of the *Concha*, according o the Force or Weakneſs of the Unduations of the Air.

The Muſcles of the external Ear, ſerve to contract and to dilate it.

The Obliqueneſs of the auditory Paſage ſerves not only to defend the *Memrana Tympani* from the Injuries of the Air, but alſo this Obliquity affords a arger Surface to the Paſſage, and is the Cauſe that there are more Refractions made here, and this may contribute to render he Impreſſion ſtronger.

The Obliquity of the Paſſage, is proper to preſerve the Membrana Tympani *from the Injuries of the Weather.*

And to render the Vibrations ſtronger, by doubling its Refractions.

The Wax ſtops extraneous Bodies, which might impair the Membrana Tympani.

The Wax, or ſort of Glue, which found in the anterior and cartilagino Part of the auditory Paſſage, ſtops a Filth and Inſects which elſe might ent into the Ear, and which wou'd be a ſu Cauſe of impairing the *Membrana Tym pani*. But if this Wax has its Uſes, has alſo its Inconveniencies, ſo that if w don't take care to clean our Ears, this gl

It may alſo be prejudicial to the Ear, when it is too thick, and in too great a Quantity.

tinous Matter will be amaſs'd in it too great a Quantity, and growing thi by its Detention, will at laſt be a mea of obſtructing the Undulations of t Air from coming to the *Membra Tympani*. It is not long ſince, that ſearc ing out the Cauſe of Deafneſs in a Perſo who had been afflicted with it ma Years before his Death, I found in t auditory Paſſage, about two Lines fro the *Membrana Tympani*, a ſmall Pelle which was ſoft and pretty thick with conſiderable Quantity of Filth indurate collected before it, and I don't dou but that this ſort of Deafneſs is ve common.

We have taken Notice, that the ca tilaginous Paſſage which is broke off many Places, forms a ſort of a litt Tongue, which is at the Extremity the Cheek before the *Concha*, and direc

at the Entrance into the auditory Paſ-
ge. This little Tongue hinders the
efractions which are made in the Inſide
the *Concha*, from eſcaping out of this
vity, making them paſs more exactly
o the Inſide of the auditory Paſſage:
ſeems alſo to be of Uſe in ſtopping up
e Ear upon which it is plac'd, and con-
uently hindering the Impreſſion of the
r upon theſe Parts, as the Eyelid be-
g ſhut, hinders it from coming to the
e.

We have already ſaid, there are three
mifications of three different Pair of
erves, which are diſtributed upon the
rtilaginous Part of the auditory Paſſage,
ich occaſion that extreme Senſibility,
ich is found in this Part, by which the
imal is advertis'd of the leaſt extrane-
s Body, which might inſinuate it ſelf
o the auditory Paſſage.

This will ſuffice for what concerns the
ernal Ear; the *Membrana Tympani* is
e firſt Part which preſents it ſelf to
w in the internal Ear, and although it
y be ſaid not to be abſolutely neceſſary
Hearing, ſince ſome that are deaf ta-
g hold of the Handle of an Inſtrument
their Teeth, can hear the Sound of
it is nevertheleſs of ſo great a Conſe-

The Membrana Tympani *is neceſſary for the Preſervation of the other Organs.*

quence, that if we lacerate or pierce
through in any Animal, they may hear t
lerably well for ſome time; but th
Hearing will grow inſenſibly weaker, a
they will entirely loſe it at laſt.

It is extended and relax'd by the Muſcles of the Malleus.

This Membrane is extended and relax
by the little Muſcles belonging to t
Malleus, which is join'd to the back Pla
of this Membrane: the external Muſc
relaxes it, and forms it into a plain S
perficies; the internal Muſcle which
ſituated upon the Surface of the *Os P*
troſum, draws it inwards, and conſequen
ly extends it more than it is in its natu
State. Now the Tenſion of the *Me*
brana Tympani is form'd in ſuch a ma
ner, that both the Muſcles act togethe
whereas in its relax'd State, the Acti
is perform'd by the external Muſcle
lone. The Reaſon of this is, becauſe t
Inſertion of the external Muſcle, bei
oppoſite to it, is fix'd near the Head
the *Malleus*; whereas the other Mu
cle is inſerted on the other Side, a lit
lower towards the Handle. The Force
the Contraction of the internal Muſcle
increas'd by that of the External, ſo t
theſe two Muſcles draw the Extrem
of the Handle of the *Malleus* inwards,
which the Tenſion of the *Membrana Ty*

p

ni is chiefly attributed. The Figure
xplains this more clearly. *See* Plate VI.
ig. V.

It is certain then that theſe little Muſcles
ct, and it is alſo evident at leaſt of the
vo firſt, that one extends and the other
laxes the *Membrana Tympani*; but the
ifficulty is to know on what Occaſions
ey act, and what it is that cauſes them
place this Membrane in thoſe different
oſitions in which it muſt neceſſarily be,
receive the different Impreſſions of
oiſe, and of different Sounds.

Is it the Will that makes them act?
here is not the leaſt Reaſon to ſuſpect
: For in ſhort, a Noiſe moſt commonly
rpriſes us without our being appriz'd of
And it is my Opinion that the Ob-
cts themſelves are the ſole Motives,
hich cauſe theſe Muſcles to extend or
ax the *Membrana Tympani* on diffe-
nt Occaſions, according to their diffe-
nt Impreſſions.

The Will is not the Cauſe of theſe Muſcles acting;

Therefore it is my Sentiment, that the
embrane of the *Tympanum* muſt be
riouſly diſpos'd for the receiving the
rious Undulations of the Air, and that
Reality it wou'd be impoſſible for it to
nſmit them ſuch as they are, if it was
in ſome meaſure fitted to their Cha-
cter; and if on different Occaſions, it did

But the different Diſpoſitions of the Objects.

E not

not form it ſelf, if I may uſe the Expreſſio
into proper Tenſions to repreſent the v
rious Tones of the ſonorous Bodies. W
know that upon placing two Lutes up
one Table; if upon playing upon o
String, we wou'd make a String of the
ther Lute move, we muſt of Neceſſi
place it in Uniſon with that which we pl
upon; either in the Octave, or ſome
ther Accords; as the double Octave,
the Fifth or the Fourth; otherwiſe it w
indeed vibrate, but the Vibrations w
be very weak, and never audible.

And according to the different Occaſions which concur, The Membrana Tympani *is more or leſs relax'd.*

This being allow'd, we may with
great deal of Probability advance, th
ſince the Diverſity of Noiſes and Soun
depend upon the different Nature and v
rious Pulſations of the ſonorous Bodie
that for example, the acute Tone pr
ceeds from a Pulſation on a Body, who
Particles are diſpos'd in ſuch a manne
that they are incapable of any but ve
quick Vibrations, which they immediat
ly communicate to the Air; that on t
contrary the Grave Tone is produc'd
a Pulſation on a Body ſo order'd, that
is capable of none but very ſlow Vibr
tions: We may, I ſay, aſſert that t
Membrane of the *Tympanum* confor
in ſome manner to the different Diſp
ſitio

According to the Diverſity of Sounds.

ions of the ſonorous Bodies in its diffe-
ntStates ofTenſion andRelaxation; and,
we may be allow'd the Expreſſion,
ts on their Character; as for example,
is extended for acute Tones, becauſe
this State of Tenſion it is more capable
quick Vibrations, but on the contrary,
is relax'd for Grave Tones, becauſe it
ing thus relax'd, it is better diſpos'd
r ſlower Undulations; and laſtly, it ri-
and falls in a thouſand different Ways,
the different Ideas of the different
oiſes and Sounds. I confeſs it is hard
conceive how this is perform'd; they
mechanical Motions which are imper-
ptible, the Nature and Cauſes of which
difficult to explain.

Which it does in putting on their Characters.

By mechanical Motions, which are difficult to explain.

The *Membrana Tympani* therefore re-
ves the various Undulations of the
r, and communicates them afterwards
the other Parts of the internal Ear. It
dry, thin and tranſparent Membrane,
s Structure renders it fit for that Uſe,
d if theſe Qualities happen to be im-
r'd, we need not be amaz'd if a
ickneſs of Hearing thereupon enſues.

The Agitation of the Membrana Tympani *is communicated to the other Organs of Hearing.*

There is room to believe that the Air,
ich is found in the *Tympanum*, being a-
ated by the Pulſations on the *Mem-*
na Tympani, contributes partly at leaſt
communicate them to the immediate

Not ſo much by the help of the Air which is incloſ'd in the Cavities of the Ear, Organ. But nevertheleſs there is no ap parent Reaſon to imagine that this ſmal Quantity of agitated Air, is capable o ſhaking the *Os Petroſum*, or rather th Labyrinth which is contain'd in the O *Petroſum* ſtrong enough: So that we ma aſſert with great probability, that th Pulſations on the *Membrana Tympani* ar alſo communicated to the *Malleus*; whic the *Malleus* communicates to the *Incus* the *Incus* to the *Stapes*, whoſe Vibratio ſhakes the *Os Petroſum* and the *Labyrin thus*, in the ſame manner as the Air whic is between two Lutes that are placed upo one Table, is incapable of communicatin entirely the Undulation of a String of o of them to that of the other: but th String that is ſtruck, muſt firſt ſhake th Wood of the Lute to which it is fix'd afterwards the Wood of the Lute mu ſhake the Table; the Table the Wo of the ſecond Lute; and laſtly, the Wo of this Lute the String which is fix'd it, and which is in Uniſon with that the other. And this is ſo true, that we take one of the Lutes off of the T ble, and hold it up in the Air, the E periment won't ſucceed.

As by the Aſſiſtance of the little Bones.

Which ſhake the Labyrinth, and the Air which is incloſ'd in it.

The Nature, Mechaniſm, and Artic lation of theſe three little Bones ſeem favour this Opinion; they are dry, th

a

nd hard, and conſequently very capable f being agitated. The *Malleus* through he whole length of its Handle is fix'd o the *Membrana Tympani*, ſo that it is aſy to imagine that this Membrane can't e agitated without communicating its Agitations to the *Malleus*, and ſo ſucceſſively to the other little Bones, ſince they re articulated together, and their Articulation being without Cartilages, may aſily facilitate this Communication of he Vibrations from one to the other.

It is very difficult to determine the Uſe f the Muſcle of the *Stapes*; we may ſuppoſe that in drawing the *Baſis* of the *Stapes* a little outwards, which is immediately ſituated upon the *Feneſtra Ovalis*, it extends the little Membrane with which the upper part of its *Baſis* is cover'd; and therefore as it extends it more or leſs, it renders it alſo more or leſs diſpos'd to receive the Vibrations of the *Membrana Tympani*, and to communicate them to the *Veſtibulum*, and to the Labyrinth. We may alſo add, that in drawing out the *Stapes*, which is alſo pretty flexible, it extends it in ſome meaſure, and keeps it in a firmer State, and conſequently diſpoſes it in a better way, to receive the Vibrations of the *Malleus* and *Incus*.

The Muſcle of the Stapes, *ſerves to extend the Membrane which is fix'd to its* Baſis.

And to extend the Stapes *itſelf.*

The Paſſage of the Proceſſus Mammillaris *affords a Paſſage to the Air, when it is over-preſs'd in the* Tympanum.

I have already ſaid, that at the Sides
the *Tympanum* there are two Paſſages, on
of which terminates at the Palate, an
the other proceeds into the *Cavernulæ*
the *Proceſſus Mammillaris.* It ſeems
be very likely, that when the *Membran*
Tympani is drawn inwards, the Air whic
is incloſ'd in the *Tympanum* retires in
theſe two Paſſages, and that it returns in
to the *Tympanum*, when the *Membran*
Tympani is relax'd, otherwiſe the Motio
of this Membrane wou'd be very much re
tarded by the Elaſticity and Reſiſtance
the Air, if it had no way to paſs out of i
And there is the ſame Reaſon to believe
that the return of this Air into the *Tymp*
num, favours the Reduction of the *Mem*
brana Tympani into its natural Diſpoſition

The Aqueduct *ſerves to bring the Air from without to it.*

And to renew that which is in the Tympanum.

The Paſſage which goes from the Pa
late to the Ear, furniſhes the Air whic
is neceſſary for the continual Renewing
that of the *Tympanum:* And as the to
great Coldneſs of the external Air migh
be prejudicial to the internal Parts of th
Ear, therefore this ſame Air as it aſcen
up the Length of the Cavity of the No
ſtrils, and during its whole Courſe as far a
the *Tympanum*, receives ſuch Modulation
as are neceſſary and ſuited to the Structur
of the Parts thro' which it is to paſs, ye
with

ithout loſing the ſtrength of Elaſticity hich makes it capable of performing the Uſes for which it was deſign'd; and thereore the Air which returns from the Lungs, nd which is mix'd with impure Vapours, oes not ſo eaſily enter into this Canal, he Orifice of which is ſo plac'd at the *Fundus* of the Mouth, that it oftener reeives the Air from the Noſtrils, than hat which returns from the Lungs.

And not to ſupply the Office of the Membrana Tympani.

Almoſt every body believes that by he aſſiſtance of this Canal, ſome deaf People can hear the ſound of ſtring'd Intruments, and that their Deafneſs proceeding from the *Membrana Tympani* its not being able to diſcharge its Offices, no body ſhou'd be ſurpriz'd, if the Vibraions of the external Air being communicated to the *Tympanum*, that theſe ſort of People are capable of hearing the Sound of an Inſtrument. Nevertheleſs, o make it appear that the Vibrations of the Air which come into the *Tympanum* by the help of this Canal, are not ſufficient to make theſe deaf People hear the Sound of an Inſtrument, we muſt here take notice that they are oblig'd to hold the Handle with their Teeth, otherwiſe they could not hear it at all, or at leaſt not ſo perfect; now it is eaſy to imagine that the Teeth being agitated, this Agitation is communicated to the maxillar Bone, from thence to the *Os Temporale* then to the little Bones of the Ear ; an what yet more ſtrengthens my Opinion is, what I have ſaid concerning the Uſ which I have aſcrib'd to theſe laſt mention'd Bones: for even thoſe who are no Deaf, hear better and more ſtrongly th Sound of an Inſtrument, when they hol its Handle with their Teeth, and ſtop their Ears. Beſides this, there are ſom deaf People, who hear much better when we talk with them over their Heads: an in theſe we have Reaſon to believe tha the whole *Cranium* being ſhook, the *O Petroſum* and all the other Bones are alſo ſhaken ſucceſſively.

The Feneſtra Ovalis *communicates the Vibrations of the Air to the Labyrinth.*

I have already remark'd that the *Feneſtra Ovalis* is exactly ſhut up by the Baſi of the *Stapes*: This little dry and fin Bone, whoſe Baſis is very ſlender, and one of whoſe Sides is cover'd with a Membrane, having receiv'd the Vibrations from the two other Bones, and from the Air contain'd in the *Tympanum*, may very eaſily communicate them to the *Veſtibulum* and to the Air contain'd therein, and afterwards to the *Cochlea*, and to the three Semi-circular Canals.

Beſides this *Feneſtra Ovalis*, there is another which is call'd *Rotunda*, which is ut up by a Membrane pretty much ke the *Membrana Tympani*; and we imaine that it receives the Vibrations from e Air contain'd in the *Tympanum*, and at it communicates them to that which inclos'd in the *Scala Inferior* of the *ochlea*; which being very much conn'd and pent up in this Place, where ere is no Paſſage for its paſſing out, it very capable of cauſing a ſtrong Viration in the *Lamina Spiralis*; and afer this Manner, the Vibrations of the ir at laſt reach the immediate Organ of earing, which remains to be treated on.

The Feneſtra Rotunda *communicates them to the* Scala Inferior *of the* Cochlea.

This Organ is comprehended under e Name of the Labyrinth, which being clos'd in the *Os Petroſum*, conſiſts of wo principal Parts, *viz.* the *Cochlea*, nd the *Veſtibulum*, with its three Semiircular Canals.

The immediate Organ conſiſts of two Parts which compoſe the Labyrinth.

As for the *Cochlea*, no body need doubt f its forming Part of the immediate Organ. Its Compoſition is a convincing roof; for firſt the *Lamina Spiralis*, hich is the principal Part of it, is hard, ry, ſlender and brittle, which are the onditions requiſite to render Bodies caable of being vibrated. Secondly, This

The first of which is the Cochlea.

The Lamina Spiralis *is eaſily vibrated.*

1. *Becauſe of its Subſtance.*

2. Becauſe it is very much extended.

Lamina does not lie upon the Inſide
the Semi-oval Spiral Canal, but is e
tended, joining on one Side to the Axi
on the other, to a very fine Membra
which is connected to the Surface of t
Canal : ſo that this Situation of the *L*
mina Spiralis, is very favourable to t
Diſpoſition it muſt have to be eaſily
brated. Thirdly, The *Lamina Spira*
by the means of the little Membra
divides the whole Paſſage of the Spiral C
nal as it were into Ranges of Stairs
Scalæ in the *Cochlea*, built upon t
ſame *Axis*, the upper one of which h
no Communication with the lower. T
Feneſtra Rotunda opens into the low
one, which has no Communication w
the *Scala Superior* of this Canal, which
have before taken notice of, nor with t
Veſtibulum: So that the Air which is
clos'd in the *Scala Inferior*, is agitated
much by the Vibrations of the *Feneſ*
Rotunda, as by thoſe of the Air in t
Scala Superior of the Semi-oval Can
which is alſo as much ſhaken by the I
pulſes of the Air contain'd in the *Veſti*
lum with which it has a Communicati
as by thoſe of the Air inclos'd in the *Sc*
Inferior of this Canal; the *Lamina Spir*
lis being agitated on both ſides, its V
bratio

3dly. Becauſe in dividing the Semi-Oval Canal into two Scalæ, it receives Pulſations from the upper and the under one.

rations muſt be more lively and ſtrong.
ourthly, The Spiral Figure of this *La-*
ina is moreover a very powerful Argu-
ent to ſuſtain what I aſſert; for as it
akes two Turns and a half round the
xis, it receives the different Vibrations
f the Air in many Places, and this Me-
anifm is alſo obſerv'd in the Tongue
nd in the Noſe, *&c.* Fifthly, A con-
derable Branch of the *Portio Mollis* of
e auditory Nerve, after it is come to
e Baſis of the *Cochlea*, divides it ſelf into
any ſmall Ramifications, which paſſing
rough all the little Perforations in the
xis, are diſtributed and loſt in the dif-
rent Windings of this ſpiral *Lamina*. In
ort, this *Lamina* is not only capable of re-
iving the Vibrations of the Air, but its
ructure makes it appear credible, that
is ſufficient to anſwer to all their diffe-
nt Characters: For it being larger at the
eginning of its firſt Convolution than it
at the Extremity of the laſt, where it
niſhes as in a point, and its other Parts
minifhing in proportion in Bulk, we
ay ſuppoſe that the larger Parts may be
brated without the others participating
that Vibration; and therefore they are
apable of receiving none but the ſlower
ndulations, which conſequently anſwer

4thly. Becauſe its ſpiral Figure is the cauſe of its being vibrated in many Places.

5thly. This Lamina *receives all the different Vibrations of the Air, because of its unequal Figure.*

to graveTones: And that, on the contrary, its narrower Parts being agitated, thei Undulations are quicker, and conſequently anſwer to acute Tones. In the ſam manner that the larger Parts of a ſtee Spring form the ſloweſt Undulations, an anſwer to graveTones: And ſo its narrower Parts form quicker and more frequen Vibrations, and conſequently anſwer t acuteTones. So that in ſhort the Spirits o the Nerve, which expanded over its Subſtance, receive different Impreſſions whic repreſent in the Brain the different Appearances of Tones according to the di ferent Vibrations of the *Lamina Spirali*

The ſecond Part of the immediate Organs comprehends the Veſtibulum *and the three Semi-circular Canals.*

As for the *Veſtibulum* and the three Semi-circular Canals, although ſome ſa that they are only ſubſervient in increa ing the Impreſſions of the Vibrations o the Air, others affirm that they deade them; it is my Opinion that they for Part of the immediate Organ, for th following Reaſons.

In the firſt place, all Birds have bu three Paſſages which are curv'd in a Semi-circle, and a fourth which is ſtra and clos'd up at one End, but which opens with the others in a Cavity commo to them all, and which ſupplies th Place of a *Veſtibulum*. Theſe three Cana

ar

are alſo found in Fiſhes; there is no *Cochlea* in neither of them, nevertheleſs they hear: it is therefore certain, that theſe Semi-circular Canals are the immediate Organ of Hearing in Birds and in Fiſhes. Why then ſhould they not have the ſame Uſe in Man, ſince their Structure is the ſame in Man as in theſe Animals? From hence at leaſt it neceſſarily follows, that theſe Semi-circular Canals form part of the immediate Organ in Man, and that therefore this Organ is compos'd of two eſſential Parts.

The Cochlea *is not to be found either in Birds or in Fiſhes.*

The Semi-circular Canals alone perform the Office of the immediate Organ in theſe Animals.

Secondly, No body diſputes the Communication of the Impreſſion of Sounds to the Brain being perform'd by the *Portio Mollis:* now this *Portio Mollis* has two Ramifications which enter the Cavity of the *Veſtibulum*, and which unfold themſelves and are extended into Filaments and Membranes, which line theſe Semicircular Canals internally; from hence I conclude, that this Part of the Labyrinth forms alſo part of the immediate Organ.

There are Nerves and Membranes which are the cauſe of theſe Semi-circular Canals, forming part of the immediate Organ.

Thirdly, The Structure of the *Veſtibulum*, and of theſe Semi-circular Canals is ſuch, that we may very reaſonably imagine that the Impreſſion of Sounds is increas'd and ſtrengthen'd in theſe convoluted Paths, and that it muſt conſequently

Their Windings ſerve to augment the Force of the Air, by the Refractions which they cauſe.

ly become more capable of cauſing a Vibration on the Nerves which are diſtributed there.

Theſe Canals receive the different Characters of Tones as well as the Lamina Spiralis.

But as I have already ſaid, that the *Lamina Spiralis* does not barely receive the Vibrations of the Air, and that all its Parts are not indifferently capable of anſwering to the ſame Tones; I alſo aſſert as much of theſe three Semi-circular Canals. Every one of theſe Canals is in the form of two Trumpets, which have their narrower Ends plac'd one within the other; that is to ſay, that the two Orifices of theſe Canals are larger in the Cavity of the *Veſtibulum*, like the broad Ends of two Trumpets; and that the Middle of theſe Canals, which I look upon as the Place where the two Trumpets meet is narrower in Proportion: There are two of theſe Canals which have an Orifice into the *Veſtibulum* common to them both, which together form a very large End in compariſon to the others. Now it is demonſtrated by Experience, that the greater Circles of the broad Ends of Trumpets may be agitated without the leſſer being ſenſibly affected: That the Vibrations of the great Circles are ſlower and more diſtinct, and that on theſe Occaſions the Sound of the Trumpet is grave; whereas when the ſmall Circles of the ſame Ends of the Trumpets are agitated without the great being ſenſible of it, the Sound of the Trumpet is then acute, becauſe the Vibrations of theſe ſmall Circles are quicker and more frequent. We may aſſert the ſame of the Semi-circular Canals; their larger Parts may be agitated without the others being ſo, then the Vibrations of theſe ſame Parts will be ſlow; from whence will neceſſarily follow the Appearance of a grave Tone: *& vice verſâ*, when the narrower Parts are agitated without the others being ſo, the Appearance of an acute Tone will of neceſſity follow, becauſe the Vibrations of theſe ſmall Parts are quicker. From all that I have ſaid, we may conclude that the *Cochlea* and Semi-circular Canals, are the common and immediate Organs, which not only receive the Undulations of the Air in general, but alſo which receive the true Idea, and the different Characters of Tones, according to the different Places of thoſe Parts which are agitated.

Becauſe they are made like Trumpets.

It may be objected, that theſe Semi-circular Canals are too much continu'd, and too much fix'd to part of the *Os Petroſum*, to be eaſily agitated in their different

And their Subſtance is very eaſily vibrated.

different Parts, and in ſo many different ways. But beſides that no body can make any conſiderable Noiſe without the *Os Petroſum* being agitated, it is certain that when we prepare theſe Circles to ſhew 'em plainly by themſelves, we take notice that they are ſurrounded with nothing but a ſpongy Subſtance. It is true, that in old Heads the bony *Laminæ* which cover theſe Circles before and behind, are pretty hard; but that which fills up the Space which is round theſe Circles, is of a more porous Nature: therefore they are always diſengag'd enough, and very capable of being agitated, and of Reverberating.

It is by the Communication of the auditory Nerves with thoſe of the Voice, That the Sympathy between the Voice and the Hearing is caus'd.

By the Communication of the *Portio Dura* of the auditory Nerve, with the Ramifications of the fifth Pair which are diſtributed to the Parts, which ſerve to form and to modulate the Voice, the Communication which there is between the Hearing and Speech is commonly explain'd. Some ſay that the Vibration of the Nerves of the Ear, being communicated to the Nerves of the fifth Pair, cauſes the Spirits which flow from the Brain into theſe Nerves, which proceed to the Parts which form the Voice, to diſpoſe the Muſcles in ſuch a manner; that

at anſwering the Impreſſion which the
oice hath made in the Brain, they are
ut in a Method of forming a Voice quite
ke it. And this Reaſon is alledg'd for
Ien and Birds exciting one another to
ng, and for thoſe Men who are born
eaf, being alſo conſequently dumb.

It is alſo ſaid, that it is by the Com-
unication of the ſecond vertebral Pair
ith the external Ear, that at the leaſt
oiſe it is cuſtomary to turn one's Head:
nd all the Body is diſpos'd to make diffe-
ent Motions, according as the Cauſes of
e Noiſe are beneficial or hurtful. And
s theſe Nerves communicate with thoſe of
e Heart and the Lungs, it is from
ence that we feel the ſame Alterations
the Pulſe and in Reſpiration, accord-
g to the Difference of the Noiſes. But
very one does not agree in the Effects of
l theſe Communications.

And by the Communication of the ſecond vertebral Pair.

That the Affinity that there is between the Tones of Hearing, and the Motions of the Body is produc'd.

And that of the Pulſe.

End of the Second Part.

OF THE
ORGAN
OF
HEARING.

PART III.

Containing the Diſorders of t Organ of Hearing.

The Knowledge of the Diſtempers of the Ear, depends upon that of its Parts which are affected.

AFTER having explain
the Structure and Uſes
the Organ of Hearing,
finiſh this Subject, there r
mains nothing elſe for m
to deſcribe, but the Diſtempers of t
Ea

ar. My Deſign is not to trace them
om their Origin, but only as they relate
the Structure of this Organ; to make
appear how advantageous the Know-
dge of the Parts is to the Explication of
e Diſeaſes. I ſhall not confine my ſelf
the Diviſions which Authors common-
make; but ſhall here follow, as I have
one in my Explanation of the Uſe of the
arts, the Order of my Deſcription:
at is to ſay, I ſhall firſt examine what
iſtempers happen to the external Parts,
terwards thoſe which attack the *Mem-*
rana Tympani, the *Tympanum* and *La-*
rinthus; and laſtly, thoſe which belong
the auditory Nerve. After which I ſhall
plain the Noiſe or Tinckling, which is
Symptom common to the Diſorders of
l theſe Parts ; and I ſhall not ground
y Reaſons but upon Obſervations taken
om very creditable Authors, and upon
oſe which I have had an Opportunity of
aking my ſelf, when I was working
pon the Ear.

The moſt common Symptom of the
xternal Parts of the Ear, is Pain ; it
ommonly infeſts the *Concha*, and the
hole auditory Paſſage as far as the *Mem-*
rana Tympani. Experience teaches us
at it is accompany'd with Pricking,
Eroſion,

The Diſorders of the auditory Paſſage, which cauſe extreme Pain and remain in this Part, proceed from

Eroſion, Tenſion, Weight and Pulſa tion.

The Solution of Continuity.

I ſhall not in this place explain th Nature of Pain in general, but ſhall trea of it more largely when I come to th Organ of Feeling. Now here it will b ſufficient to know that Pain is caus'd b a Solution of Continuity of Particle which when they are united, form th firſt Conſtitution of the Parts of Anim Bodies: This Solution of Continui cauſes an irregular Motion in the Spiri and in theſe two Things the former Rea ſon of Pain conſiſts.

This being allow'd, we may eaſi know that whatſoever can cauſe a Sol tion of Continuity in the Particles of th Membrane, which lines the audito Paſſage, and excite this irregular M tion of the Spirits, is capable of prod cing Pain. Thus an Inflammation, e traneous Bodies in the paſſage, Worm and in a word, all that can cauſe Pain other Parts, may be applicable to th here. But beſides this, the Ancien have maintain'd that the Pains in the E may happen without an Inflammatio and without any conjunct Cauſe; fro whence they have explain'd theſe Pa by Intemperies alone without Matte

whi

hich they commonly believ'd to pro-ed from Exceſs of Cold or Heat: but s theſe Intemperies without Matter are naginary, and as we may find in the art, Things capable of producing this iolent Pain, I will lay down my Senti-ents of it in few Words.

Cauſ'd by the Wax, which is in the Inſide of the auditory Paſſage.

I take notice, that the Wax which is a-aſs'd in the Ear is bitter and viſcous, nd that conſequenlty it abounds with crid and lixivious Salts, which are mix'd ith thick and oleaginous Particles; theſe rinciples give it very nigh the Qualities hich are attributed to the Bile, which very much reſembles. If it happens y any Means whatſoever, that theſe line Juices diſengage and expand hemſelves, and that being more exalted han uſual, their Points act with more iolence; it is evident that they muſt auſe great Diſorders in the auditory aſſage, becauſe of its extreme Senſibili-y. Cold and Heat are moſt commonly e Cauſes of it. For Cold thickening his Wax, and rendering it more viſcous, auſes it to obſtruct and ſtop up the ex-retory Ducts of the Glands, as it may be bſerv'd in the other neighbouring glan-ular Parts, in which this Action of the ir cauſes the like Obſtructions: from whence

The external Cold increaſes the Acrimony of it;

By the Obſtruction of the excretory Ducts of the Glands.

whence it follows, that the ſaline Juic
which were in motion, and in a Diſpo
tion to paſs out, being obſtructed in th

Which renders the ſaline Juices more pungent.

Glands, puff up and ſwell them ; an
becoming more acrimonious by their b
ing detain'd, prick upon the Extremiti
of the Nerves, with which the audito
Paſſage is ſtor'd ; and are the Cauſe of
very great Diſorder in the Spirits, an
conſequently of that great Pain of th

By Heat, which looſens and diſſolves theſe ſaline Juices.

Ear. On the other hand, the extern
Heat looſens and diſſolves the ſali
Juices of this Wax, and produces by th
Means the ſame Effect. The ſame Thin
is obſervable in the Pains, which a
caus'd by the Bile in the alimenta
Parts, by the exceſſive Degrees of He
or Cold.

Or by the ſharp ſaline and ſerous Humours, which ſometimes come out of the Glands of the Ear.

But the Ear-Wax is not the only Cau
of theſe acute and violent Pains; it ve
often happens that thoſe ſharp, ſalin
ſerous Humours, which are evacuated b
the Glands of the Ear, cauſe Pain in th
auditory Paſſage, which is apparent
the Suppurations of this Part: For
theſe ſerous Humours which are emitte
are ſometimes Acrimonious or Salin
they ſtimulate the Membrane of the Pa
ſage, and excite an uneaſy Senſatio
which is what we call Pain.

As for the different Senſations of Pain,
believe they may be accounted for in
is Manner: When the ſaline Particles
Wax, or even the other Humours
ntain'd in the Subſtance of the Glands,
e become pointed and hard, and by be-
g more ſtrongly agitated than uſual,
ey ſtrike violently upon the nervous
laments of this Paſſage, and produce
pungent Pain, which happens in all In-
mmations, and eſpecially in Perſons of
dry and bilious Habit of Body, whoſe
umours are fill'd with thoſe acrid and
ine Juices: and in People of a melan-
olic Habit, in whom the ſerous Part
the Blood is always ſharp or ſalt;
ien theſe Salts become very acrimo-
ous or very corroſive, they cauſe Pain
company'd with Eroſion, which is
iefly to be taken notice of in Ulcers
this Part. When the Subſtance of the
ax which is ſtill contain'd in theGlands,
fermented alone or with other Fluids,
extends or dilates the Particles of the
embrane, and cauſes a Senſation of
enſion. When the Glands are ſwell'd
ch the abundance of the Fluid with
ich they are fill'd, they leave a Senſa-
n of Weight: As for that ſort of Pain
ich is accompanied with Pulſation, I
believe

The different Solutions of Continuity, cauſe the different Senſations.

Of pungent Pain.

Of Eroſion.

Of Tenſion.

Of Weight.

Of Pulſation.

believe it never happens to the auditor Paſſage, but when it is inflam'd.

This Pain is very violent, becauſe

The Membrane of the Paſſage is compos'd of a fine and nervous Texture.

And receives a great Number of Nerves.

This fix'd cloſe upon the Bone.

There is nothing ſo ſurprizing as th Violence of this Pain ; it is hardly eve without an acute Fever, which is attended with Wakings, Deliriouſneſs, Convulſions, and Swoonings ; Symptom which are often the Cauſe of Death, a may be ſeen in Obſervations made by many Authors: For the better underſtanding the Violence of this Pain, we muſt obſerve, Firſt, That the Membrane, which lines the auditory Paſſage, is fine an nervous, and compos'd of the ſame Texture as the nervous Membrane of the Stomach and Inteſtines, excepting its not being indu'd with thoſe *Villi*, to preſerve i from the Acrimony of the Humour 2. It is cover'd with an infinite Numbe of Nerves, which it receives from the fift Pair, from the *Portio Dura* of the auditory Nerve, and from the ſecond vertebral Pair, as it has been deſcrib'd in th firſt Part of this Treatiſe ; and we ma aſſert, that there is no Membrane in th whole Body, which has more Nerves i proportion than this has. It is certai that thoſe Membranes which are fix' cloſe upon the Bones, have a more exquiſite Senſation than the others, whic

ma

ay poſſibly proceed from their being
ore firm and more extended, and that
eing connected to the Bones by all their
nall Veſſels which they ſend off to them ;
is impoſſible that theſe Veſſels can be
imulated, without all their ſmall Rami-
cations being agitated at the ſame time,
nd for this Reaſon the *Perioſteum* and *Pe-*
cranium have ſo exquiſite a Senſation:
nd in the ſame manner we may imagine
at the acuteſt Pains of the Head pro-
eed from the Adherence of the *Dura*
ater to the Top of the *Cranium*, as
has been obſerv'd. This is eaſily ap-
licable to the Membrane of the auditory
aſſage, for this Paſſage is partly bony
d partly cartilaginous, and the Mem-
rane is extended upon the Cartilage,
ough not quite ſo much as it is upon
e Bone. Now it is remarkable that
oſe Pains which infeſt the Bottom of
e Ear, which is the bony Canal, are
ways the moſt violent. 4. The Con-
exion of this Membrane with the neigh-
ouring Parts, may greatly contribute to
e Acuteneſs of the Pain; for this Mem-
rane is extended as far as the *Membrana*
ympani, which communicates with the
embranes which line the *Tympanum*,
d with thoſe of the Labyrinth; and

And connected with other very ſenſible Membranes.

by their means with the *Dura Mater* After, need we be aſtoniſh'd if the Pai in the Paſſage are ſo ſharp and violent

Although the greateſt Part of th Symptoms which accompany the Pa of the Paſſage, may be met with in th Pains of other Parts, nevertheleſs as the Symptoms are more frequent and mo violent in this Part, I judg'd it neceſſar to explain them.

When this Pain is caus'd by an Inflam mation, there is no Difficulty in givin a Reaſon for the Fever, and the oth Symptoms which commonly attend i But as I am convinc'd the Acuteneſs the Pain alone may cauſe all theſe Sym toms without either Inflammation or T mour, I ſhall apply myſelf chiefly this laſt Caſe.

And this often cauſes an acute Fever,

By the Agitation of the Spirits.

I begin with the violent Fever, whic almoſt always accompanies the Pain the Ear; and I take this to proceed fro the Spirits being agitated by the Vi lence of the Pain, which encreaſe the M tion of the Heart and of the Arterie which is the Cauſe of the Quickneſs the Pulſe and of the Increaſe of Hea as is viſible in ſome Paſſions, and par cularly in that of Anger. But this Au mentation of the Motion of the Hea

d Blood, does not produce a real Fe-
r without it diſorders the Principles of
e Blood. Now it is eaſy to conceive,
it by theſe ſtrong Contractions of the
eart, the Parts of the Blood being
ore exactly broken and divided, an
altation of its moſt active Particles
caus'd, and its oily Part is more per-
tly diſſolv'd, whoſe ſwift and rapid
otion is the Cauſe of Heat in the Fe-
. Moreover, the acrimonious and cor-
ive Juices of the Wax, and of the ſe-
s Humours which are amaſs'd in the
r, may re-enter and mix with the
aſs of the Blood, and there cauſe an
raordinary Fermentation, in which
Eſſence of a Fever conſiſts. We
ll eaſily comprehend this ſort of Fe-
, if we conſider that in Colds the
ver ſprings from the Mixture of the
rp Juices, which ſeparating from the
aſs which is the Cauſe of the Continu-
e of the Cold, mix with the Blood.

And by the Fermentation of the Blood.

Watchfulneſs.

The Watchfulneſs, or Inability of
ep, depends upon the extraordinary
itation of the Spirits; which finding
mſelves continually irritated by the
olence of the Pain, flow continuallly
the Parts, and maintain them in their
nctions.

The Delirium. The Deliriouſneſs differs in noth
from the Watchfulneſs, but that in
the Spirits moving irregularly in
Brain, they touch at the ſame time ma
Traces of the Memory and Imaginati
which cauſe a Confuſion in the *Ide*
that theſe ſame Spirits repreſent to
Soul.

Convulſions, The Convulſions are eaſily explai
in this *Hypotheſis*; for the involunt
Contractions of the Muſcles being cau
by the irregular Motion of the Spir
it is ſufficient that the ſaline Juices
mulate the Nerves, which are interſpe
ed in the Membrane of this Paſſage,
cauſe that Irritation to be communica
to all the Spirits, by the Communicat
of the Nerves and Membranes, and
terwards to cauſe Convulſions in the M
cles. Beſides, it may happen that th
ſharp Juices re-enter the Blood, and
ing carried to the Brain, cauſe Irr
tions in that Origin of the Nerves.

And Swooning. To give a Reaſon for the Swooni
we muſt conſider, that the Spirits flo
ing ſwiftly, and in great abundance
to the Muſcular Fibres, which contr
and ſhut up the Orifices of the Hea
they ſtop the Motion of the Blood ;
when this Contraction ceaſes, and

Blo

od enters afreſh into the Heart, the lſe and the Heat are renew'd: The ppreſſion of the Heart and Weight in Breaſt, which are felt in this State, pretty ſure Indications of the Swoon- proceeding from the Cauſe which have juſt deſcrib'd; and this Oppreſſi- of the Heart may continue ſo long, ſometimes to be the Occaſion of ath.

Hiſtory upon this Subject.

For an Example of a great Pain in Ear, accompanied with violent Symp- ms, I ſhall content myſelf with only ing you the fourth Obſervation of the ſt Century from *Fabricius Hildanus*, be- uſe it includes all the principal Symp- ms. A young Girl twelve Years old, ving by chance let a Glaſs-Ball enter o the Hole of her left Ear, which uld by no means be extracted, was zed with acute Pains, which were com- unicated to the ſame Side of the Head: heſe Pains, after a long ſpace of Time, d produce a Numbneſs in the Arm and and, afterwards in the Thigh and Leg, d at laſt in all the left Side. This umbneſs was accompanied with very eat Pains, which encreas'd in the Night, d in cold and wet Weather with an regularity in her *Menſes*, with Epileptic

Fits, and with an Emaciation of her l
Arm. *Fabricius Hildanus* eight Years
ter extracted the Glaſs-Ball, and th
all the Symptoms ceaſed, to which
the other Remedies which were us'd
ſo long a time, could not give the le
Eaſe.

Remarks upon this Hiſtory.

Many Remarks might be made up
this Obſervation ; but as I have explai
the greateſt part of its Symptoms, I ſh
apply myſelf only to ſome which are p
ticular in this Caſe. The Pains and Co
vulſions ſeiz'd on all her left Side to t
end of her Foot. *Hildanus* has explai
this *Phænomenon*, by ſaying that t
Portio Dura is diſtributed along the Ar
and to the Thigh : But as this Diſtrib
tion is imaginary, I ſhall endeavour
give a Reaſon more ſuitable to the Par
I therefore think that the Irritations a
irregular Motion of the Spirits, had p
into all the Nerves of the *Medulla*
this ſide, by the Communication of t
ſecond Vertebral Pair : This is wh
would not have happen'd, if the Irrit
tion had been communicated to the Brai
for then there is Reaſon to imagine th
this Girl would have ſuffer'd Pains an
Convulſions in all Parts of her Body
From whence I ſuppoſe the left Side

t

the *Medulla* to be only affected: it is eaſy to conceive how this Indiſpoſition ſhould paſs into the Arm and into the Leg, ſince we know that all the vertebral Nerves of the ſame Side communicate with one another by tranſverſe Ramifications, after they have paſſed out of the *Foramina* of the *Vertebræ*.

All the Symptoms increas'd in the Night and in wet weather, becauſe the Humidity of the Air puffing up the Glands and the Membranes of the Paſſage, made it more cloſely embrace the Glaſs-Ball, which increas'd the Irritations.

The Numbneſs in all likelihood proceeded from the irritated Spirits opening and dilating the Orifices of the Nerves, in ſuch a manner that they not only afforded a Paſſage to the Spirits, but alſo to much groſſer Subſtances; which being forc'd into their Tubes, caus'd a ſort of an Obſtruction in them, capable of hindering the Motion of the Spirits, which is ſufficient to cauſe a Numbneſs. Theſe Subſtances becoming more acrimonious by their Detention, increas'd the Pains and Convulſions; which being found more violent in the Arm, its Nerves imbibed ſuch a Quantity of theſe extraneous Subſtances,

ſtances, that the Motion of the Spirits was thereby interrupted, which was the Reaſon of the Arms becoming emaciated and wither'd, as it happens in Palſies.

After the Glaſs-Ball was extracted, the Irritations which it caus'd ceas'd, and conſequently the Pains and Convulſions: The Spirits recovering their common Courſe, inſenſibly diſſipated all the extraneous Bodies, which caus'd the Arm to regain its Motion and priſtine Vigour.

Remedies to be us'd for the Pain caus'd

I now come to the Means which are to be us'd in the Cure of this Diſtemper. They muſt be different, becauſe of the Diverſity of the Cauſes which produce it. As for the Pain, that which is produc'd by Cold, is ſometimes cur'd by taking away the external Cauſe; that is to ſay, by keeping it from the Cold and the Wind, and by applying upon the Ear, every thing that way warm it, as thick Wool, or hot Bread, which may alſo be ſteep'd in Spirits of Wine; but the Pain ſeldom yields to theſe firſt Remedies, and then we muſt be oblig'd to proceed to the general Remedies: Bleeding is neceſſary to hinder a Collection of thoſe Bodies, which the Cold has detain'd; and as for Purging, it is not to be order'd till the violence of the Pain is diminiſh'd. During

ring their Uſe, Fomentations are very ſucceſsfully employ'd, or Injections compos'd of the Juices or of the Decoctions of *Baum*, *Hyſſop*, *Calamint*, *Origany*, *Marjoram*, in which we may mix ſome Drops of Bullocks Gall, or rather ſome Drops of Oil of bitter *Almonds*, or *Camomile*, *Cloves*, *Aniſeeds*, &c. Authors very much recommend the ſtopping the Ear with Cotton perfum'd with Musk; there is no Difficulty in explaining the Effect of theſe Remedies, they are all endued with a very penetrating volatile Salt, which warming theſe Parts, open the Pores, and the Ducts of the Glands, and cauſe the Subſtance to flow, which was before retain'd by the Cold.

For the Pain proceeding from Heat.

The Pain which proceeds from Heat, is moſt commonly cur'd by general Remedies, eſpecially by Bleeding, which is abſolutely neceſſary to hinder a Fluxion and an Inflammation, which might happen to the Part. During the Uſe of theſe Remedies, we may with great ſucceſs make uſe of Injections compos'd of Milk, that of a Woman is better than any other, when it is mix'd and beat up with the White of an Egg; beſides this, they make their Injections of ſome cooling and emollient Decoction, in which they drop ſome Oil of ſweet Almonds ; th Yolk of an Egg is very much commended by *Devigo*. We may alſo apply ſom emollient and anodyne *Cataplaſm* upon the Ear; and when the Pains are extremely violent, we muſt have recourſe to *Narcotics*, which may be mix'd with th topical Remedies, and likewiſe be given internally. All theſe Remedies are ſo well known, and ſo much us'd, that ſhall not ſtop here to give you an Account of their Operations.

For the Pain caus'd by ſerous Humours.

When the Pain is caus'd by ſharp and ſalt ſerous Humours, the Water of *Carduus Benedictus*, or bleſſed Thiſtle, is us'd in which, Woodlice, Earthworms, and Ants Eggs, &c. are boil'd: We may add a few Drops of Oil of Box. As the Medicines abound with an *alkalious* volatile Salt they deſtroy the Acidity of the ſerous Humours, which were the Cauſe of the Pain.

The Cauſes which produce the Inflammation in the auditory Paſſage are,

The ſecond Diſtemper that I ſhall take notice of incident to the auditory Paſſage is Inflammation with Abſceſs, and Ulcer, which commonly ſucceed it. An Inflammation proceeds from Wounds and Contuſions of this Part, and may alſo be the Sequel of certain Fevers, as of the *Pleuriſy*, *Quincy*, and of many others of the ſame nature. It very often happens that an Inflammation may be produc'd in the auditory Paſſage, in two different Ways. The firſt is from an Obſtruction of the Glands, which preſſing upon the Veſſels, ſtop the Blood, and by that means are lacerated by it. The ſecond is from the Acrimony of the Wax, which may lacerate theſe ſame Veſſels, and by that means cauſe an Extravaſation of the Blood. However it be, the Inflammation and Abſceſs which ſucceed it, have nothing particular in them, but the violent Pain which I have already deſcrib'd.

The Obſtruction of the Glands.

The Acrimony of the Wax.

Which cauſe Abſceſſes,

The Ulcers of this Part are form'd in the ſame manner as Ulcers of other Parts, either from a Rupture of an Abſceſs, or by the Acrimony of ſome Fluid: I take notice that they commonly ſend forth a very large Quantity of Matter, and that they are very difficult to cure, eſpecially thoſe which are in the bony Part of the Paſſage. The Quantity of Matter proceeds not only from the Blood which is ſuppurated, but alſo from the Glands, which being always irritated by the *Pus*, ſpue forth a very large Quantity of Fluids through their excretory Ducts; and the Difficulty which is found in curing theſe Ulcers,

And Ulcers.

Which are very difficult to cure.

Ulcers, proceeds from their being conſtantly moiſten'd by the Fluid, which comes from theſe Glands, ſo that they cannot be dry'd up : beſides, the Matter which proceeds from theſe Glands, being ſharp and ſaline, hinders the *Reunion* and the *Cicatrix*; the ſame thing happens in Ulcers of the Noſe, of the ſalivary Ducts, *&c.* Ulcers in the bony Paſſage are more difficult to cure than thoſe of the cartilaginous Paſſage, becauſe the bony Paſſage runs down towards the *Membrana Tympani*, and makes a conſiderable Deſcent in the Place where it grows flat, which is the Cauſe that the *Pus* cannot paſs out of it but with difficulty ; whereas the Deſcent of the cartilaginous Paſſage being towards the *Concha*, the *Pus* and other Humours are immediately evacuated, and don't remain here as they do in the other Paſſage.

We ſometimes meet with Worms in the Paſſage.

It ſometimes happens in old Ulcers of the Ear, that Worms of different Figure and Size come out with the *Pus*, as may be ſeen in the Obſervations made by *Foreſtus Schenkius*, and in the *German* Journals. I ſhall not ſtay here to examine whether theſe Worms are produced by the Corruption of Humours, or whether the Heat only of theſe Ulcers hatch the Eggs, which thouſands of Inſects that fly in the Air may poſſibly leave in this place; I ſhall have an Opportunity of treating of it upon ſome other Occaſion.

The Cauſe of the Suppuration, and the Flux of Blood,

Beſides the *Pus* which paſſes out of the Ears in Ulcers, it is remark'd that in almoſt all Children the Ears emit a great Quantity of Humidity, and that this Evacuation is of very great uſe to 'em; wherefore we take care not to ſtop it, or elſe the Children wou'd fall into convulſive and epileptic Fits, which has made it been believ'd that this Fluid came from the Brain as well as thoſe clear and fetid Humours which ſome People emit at their Ears: Nevertheleſs, it is certain that there is no viſible Ways by which any thing can come from the Brain into this Part: for there is but one *Foramen* in the *Os Petroſum*, which forms an impervious Paſſage at its Extremity on the Side of the Ear, and which is exactly ſtop'd up by the auditory Nerves; therefore it is ſcarcely credible, that any thing can come by that Way. But if even theſe watry Humours and Blood cou'd erode the Bottom of this *Foramen*, and ſo procure a Paſſage through this Place, theſe cou'd enter no where but into the *Veſtibulum* and *Cochlea*, and muſt neceſſarily

Which apparently does not come from the Brain.

neceſſarily erode the Membrane which cloſes up the *Feneſtra Rotunda*, the Baſis of the *Stapes*, and the Membrane that covers it, to paſs into the *Tympanum*; at laſt, when they are come into the *Tympanum*, they certainly muſt rather fall into the Mouth through the Aqueduct, than lacerate the *Membrana Tympani*, to paſs through the auditory Paſſage. I do find this Difficulty in explaining theſe *Phænomena*; if Children emit a great Quantity of watry Humours through their Ears, it muſt be attributed to the Diſpoſition of their Blood, which is aqueous; and to the Relaxation of the Glands of the Ear, which is alſo found in the Glands of the neighbouring Parts. And if the Suppreſſion of this Evacuation cauſes them to fall into Convulſions and Epilepſies, it is eaſy to underſtand how this happens, becauſe theſe Juices being ſtopt, may become more acrimonious by their being retian'd, and cauſe Irritations on the Membrane of the Paſſage, and may even return into the Maſs of Blood, and afterwards be diſcharg'd on the Brain. As for thoſe Perſons who emit clear fetid Water from this Paſſage, we muſt take notice, that although the Glands of the Ear are chiefly deſign'd in their natural

State for the Secretion of the Wax, for the Uſes I have before ſpoke of; there is no Obſtacle to hinder them from ſerving as an Outlet, for the Evacuation of pernicious Humours, which is plainly ſeen in all the conglomerate Glands: and as for the Blood which in Wounds of the Head comes out of the Ears, we know that this proceeds from a Rupture of the Veſſels, which are interſpers'd upon the Paſſage. It is eaſy to judge, by the violent Emotion, that all the *Cranium* ſuffers on this Occaſion, how a Rupture may be produc'd in this Part as well as in the Brain. Laſtly, I ſhall give ſome Obſervations to prove that the Suppurations which are made in the Ear, have no manner of Communication with the Brain. A Man about ſixty five years old, of a full and ſanguine Habit of Body, had a very conſiderable Suppuration in his Ears, and eſpecially in his Right, for five and twenty Years together, although in all other reſpects he enjoy'd a perfect Health. The Matter which he diſcharg'd was fetid and very thick; he died of an Apoplexy in four and twenty Hours after this Suppuration was ſtopt. I open'd the *Cranium*, and having carefully examin'd all the Parts of the Brain near the *Os Petroſum*, I found them perfectly ſound, and the Bone in its natural State, and I actually met with ſerous Humours in the Ventricles and Cavities of the Brain, which were extremely different from the Matter which came from the Ears: I have open'd the Ears of many Children, whoſe *Tympanum* was full of Filth, yet I never found any bad Diſpoſition either in the Brain, or in the *Os Petroſum.*

Cure of the Inflammation.

Abſceſs.

To cure the Inflammation of the auditory Paſſage, we muſt take the ſame Methods that are uſed in all Inflammations of the external Parts; that is to ſay, firſt to ſtop the Fluxion by Bleedings, and by thoſe Remedies which are called *Anodyne*, which we have already mentioned in the Cure of the Pain; to which may be added, Oil of Roſes, Oil of Water-Lillies, the Juice of Lettices, of Garden-Nightſhade, *&c.* But if the Inflammation continues and tends to Suppuration, we muſt make uſe of Suppuratives; ſuch as the Cataplaſms of Crumb of Bread, and thoſe which are made of Onions, Lilly-Root, freſh Butter, and Oil of Chamomile or Melilot.

Ulcer.

When the Abſceſs is open'd, we muſt make uſe of deterſive Injections, made with Barley-Water and Honey of Roſes; and if there is a Neceſſity for ſtronger Remedies, we may uſe Decoctions of Agrimony and Birthwort, and other vulnerary Plants, in White-Wine, in which we muſt mix Honey of Roſes or Oxymel Squills; if the Ulcer is ſordid and putrid, the Tincture of Aloes made with Spirits of Wine may be us'd, and the Green Balſam of *Mets*, if it is very deep.

After this Ulcer is deterg'd, we muſt dry it up, and cicatriſe it: for theſe Intentions, the Decoctions made of Plantain, Birthwort, Gall-Nuts, *&c.* are very much eſteem'd. The *Grenada*-Wine, deſcrib'd by *Devigo*, is an admirable Medicine. As theſe Medicines have no particular Quality in them, and as they are us'd in all ſorts of Inflammations and Ulcers; I ſhall not here explain their Operation: I ſhall only ſay this, that whilſt theſe are uſing, we muſt not neglect the general Remedies, which are a very great Help in the whole Courſe of theſe Diſeaſes.

Worms.

To deſtroy the Worms, we make uſe of bitter Things to put into the Ear, as the Juices of Wormwood, of little Centory, the Decoction of Coloquintida, or elſe a few Drops of Oil of bitter Almonds, or of

Oil of Box. The *Journal des Scavans* o 1677, relates that Spirit of Wine is a infallible Remedy for Worms which ar form'd in the Ears. Thoſe of theſe Medicines, which are oily and thick, are excellent, becauſe they ſtop up the *Bronchiæ* of theſe Inſects, and ſuffocate them in an Inſtant.

And Fluxes of ſerous Humours.

As for thoſe Fluxes of ſerous Matte which we have term'd Suppurations, a they are for the moſt part indolent, an cannot be ſtopt without cauſing pernicious Effects, we ought not imprudently to ſtop 'em: In thoſe that are painful, we muſt have recourſe to the Remedies which have been already deſcrib'd, when we treated of Pain.

The third Diſeaſe of the auditory Paſſage is Obſtruction; it is occaſion'd by

Extraneous Bodies.

The third Diſeaſe of the auditory Paſſage is Obſtruction; it moſt commonly ſucceeds an Inflammation, Abſceſſes and Ulcers, which uſe to ſwell this Part. Beſides this, it may happen from many other Cauſes. In the firſt place, from extraneous Bodies, which may be introduc'd into the Paſſage, ſuch as Peas, Shot, Nut, Kernels, &c. When they have been put a great way in, it is extremely difficult to extract them, becauſe they are inclos'd by the bony Paſſage, which is very oblique, and proceeds downwards towards the

Membrana Tympani; beſides their being detain'd by the viſcous Wax, which is collected there, the greateſt Difficulty is in taking out Peas, and thoſe other Grains which ſwell in the Paſſage, and which may even bud there, as you may ſee in the Examples of *Fabricius Hildanus* and *Schenkius*.

2. The retain'd Wax.

2. The moſt frequent Cauſe of Obſtruction in the Paſſage, is the Wax which is inſpiſſated and retain'd in it: This Wax in thoſe that don't take care to clean their Ears, is collected in a great quantity, and grows ſo thick by its Stay, that it entirely ſtops up the Paſſage. It may alſo be ſometimes naturally very thick in People of a cold and pituitous Habit of Body, whoſe Humours are viſcous, and the Cold of the external Air may very much contribute to this Effect. There is alſo great reaſon to ſuſpect that this Wax may be petrified, and cauſe an incurable Deafneſs, which ſeems very likely from the Conformity there is betwixt it and the Bile, which is often petrified in the *Veſica Fellis*: and this may be confirm'd by the 45th Obſervation of *Bartholine*'s *Journals*, which relate, that his Wife having been a long time tormented with a Pain round her Ear,

Which petrifies ſometimes.

Ear, diſcharg'd ſmall Stones thro' the auditory Paſſage which came out with the Wax, after which the Pain was aſſuag'd: However, it happens this Wax is often found very thick in the form of Plaiſter, which exactly fills up the bony and cartilaginous Paſſage, which I have obſerv'd in more than ten or twelve Subjects, during the time I was buſy upon the Ear: I have conſulted many ſkilful Surgeons about it, and I may ſay, I have more than thirty Obſervations which they communicated to me, which makes it evident that this ſort of Deafneſs is the moſt common and moſt curable. And that famous Surgeon of *Mons*, who has made ſo much noiſe in the World for curing Deafneſs, undertook none but this ſort of Deafneſs: to know this, he turn'd his Patient's Ear to the Rays of the Sun, and when he diſcover'd any Obſtruction in the Paſſage, he made uſe of a particular Inſtrument to clean it, and after this manner he cur'd a great Number of deaf People.

Cauſes a ſort of Deafneſs eaſy to cure.

3d. *A Membrane.*

There are ſometimes Membranes form'd in the Inſide of the Paſſage, which cloſe it up exactly, and form a particular ſort of Deafneſs. I have before, in my ſecond Part, related that when I was examining the Reaſon of Deafneſs in a Perſon of Merit after his Death, who had been afflicted with it a long time, I found in the right Ear, which was that with which he could not hear at all, a very thick and looſe Membrane, before which there was a conſiderable Collection of Matter like Plaiſter, which was certainly the cauſe of his Deafneſs; for the *Membrana Tympani* was in its natural State, and ſo were the other Parts of the Ear.

4. Fleſhy Excreſcences,

4. The fungous and fleſhy Excreſcences, which ſometimes ſucceed Ulcers of this Paſſage, or Excoriations which may be cauſed by cleaning the Ear with too ſharp an Inſtrument, may fill it, and cloſe it up exactly.

5. By the Glands which ſurround it becoming tumified.

Which is commonly accompanied with a Relaxation of the Membrana Tympani.

5. There is another Sort of Obſtruction in the Paſſage, which is produced when all the Glands which ſurround it are tumified, and are fill'd with an over-great Quantity of ſerous Matter, in the ſame manner as we know the ſpongy Membranes of the Noſe may be ſo much ſwell'd, that they almoſt entirely ſtop up the Paſſage of the Air: This Obſtruction is always accompanied with a Relaxation of the *Membrana Tympani*, and from hence it cauſes a Deafneſs, or

at leaſt a Thickneſs of Hearing, which diſſipates when this over-great Quantity of ſerous Humours are evacuated by the Ear, or by ſome other way, in the ſame manner as all Catarrhs are cur'd.

Cure for the Obſtruction caus'd by extraneous Bodies, and the Extraction of them;

In the firſt ſort of Obſtruction the whole Method of Cure conſiſts in extraneous Bodies: to ſucceed in this Caſe, we muſt firſt conſider whether they are Bodies that may grow ſofter, ſuch as Peas, or whether they are hard and ſolid, ſuch as Leaden-Shot, Fruit-Stones, *&c.* We muſt alſo obſerve whether theſe Bodies are enclos'd in the cartilaginous Paſſage, or whether they are intangl'd in the bony Paſſage. To extract ſoft Bodies which are got no farther than into the cartilaginons Paſſage, we muſt endeavour to break them, or to introduce the Scoop behind them, which may be effected in a ſupple pliant Part, ſuch as the Cartilage of the Ear is, and ſo draw them out of the Paſſage. Hard Bodies alſo which are in the ſame Place may be extracted with the ſame Succeſs; and this may be done either with the Scoop or the *Terebra*. As for thoſe Bodies which are in the bony Paſſage, it is extremely difficult to extract them, as we have before taken notice of, eſpecially when they entirely

Which is perform'd by the Scoop, or the Terebra *when they are encloſed in the cartilaginous Paſſage.*

entirely fill up the Paſſage; for then it is eaſy to conceive that neither the Scoop nor the *Terebra* can be of any great Service. Therefore in this Caſe I recommend the making an Inciſion into the back-part and top of the Ear, which may very ſafely be practis'd in this Place, where there are no conſiderable Veſſels, and where the Paſſage is cover'd with nothing but a glandular Skin, as may be ſeen in *Plate* III. *Fig.* II. By this means we partly avoid the Obliquity of the Paſſage, and make uſe of the *Terebra*; which s beſt to uſe in the Extraction of Shot.

Or when they are contain'd in the bony Paſſage, it is effected by an Inciſion into the back-part of the Ear.

From whence we extract Shot with the help of the Terebra,

If a Fruit-Stone ſhould be inclos'd in the bony Paſſage, as it may be taken hold of by one of its Extremities, becauſe it is of an oval Figure, we then may make uſe of the Inſtrument call'd *Tenaculæ*, deſcrib'd in the 4th Obſervation of the 1ſt. Century, and which, to ſpeak proper- y, is but a double Scoop in the Form of Pincers: And for this Reaſon the Shanks muſt be made of a Plate of very fine Steel to have a Spring, and muſt be very thin. I ſhall not ſtop here to deſcribe all the Circumſtances of theſe Opera- ions, nor to ſay it is neceſſary to drop ſome Oil of ſweet Almonds into the Ear o relax the Paſſage; becauſe I ſuppoſe theſe

And Fruit-Stones with Hildanus *his Scoop.*

these things are ſufficiently known. In

Cure for the Obſtruction proceeding from the hardneſs of the Wax.

the ſecond Sort of Obſtruction, which is occaſioned by the hardneſs of the Wax, we muſt break it, and bring it away by Injections made with warm Water, emollient Decoctions, Hydromel, Linſeed-Oil mix'd with ſome Drops of Spirits of Wine; Oil of bitter Almonds, Oil of ſweet Trefoil. Some make uſe of Mineral Waters, and all Galls of Animals are commonly us'd, and that with good Succeſs. There are ſome that prefer warm Water to all other Liquids, and content themſelves with adding to it Drops of Spirits of Wine, to render it more penetrating.

The Wax is looſen'd, and comes away ſometimes in five Days, ſometimes at the Expiration of the fifteenth Day; which plainly demonſtrates that we ought not to grow weary of continuing Injections.

For the Membrane which ſtops up the Paſſage.

In the third ſort of Obſtruction, where there is commonly a Collection of Wax gather'd before the Membrane, which is form'd contrary to the Courſe of Nature: we muſt clean the Paſſage with the foregoing Injections, and afterwards pierce the Membrane; but Surgeons ought to take care at the ſame time not to damage the *Membrana Tympani.*

For to have a true Idea of the Cure of the fourth Sort of Obſtruction which is form'd by fungous and fleſhly Excreſcences, the reading of *Fabricius Hildanus*'s firſt Obſervation of the third Century will be almoſt ſufficient; wherein he gives a Deſcription of a fungous and ſchirrous Excreſcence, which happen'd in the Paſſage after an Abſceſs. Before he extirpated it, he carefully prepar'd his Patient's Body; after that, he cut away as much as he cou'd by the Ligature: out as the Root of the Excreſcence was very deep, and as his Inſtruments cou'd not oſſibly reach the bottom of the Paſſage, e was obliged to make uſe of ſome Cauſicks, which he apply'd to it by the elp of a ſmall thin piece of Wax, for ear of prejudicing the Paſſage, in which e very happily ſucceeded. To make this anner of treating theſe Diſeaſes more lain, we muſt take notice that if the *ungus* is large, and protrudes out of the aſſage, we may either cut it off with e Point of the Sciſſors, or of the Incion Knife; or elſe tye all that we can ke up with a Ligature; but I think cutng it is the beſt way, becauſe in cutting we take more of it away. As we are terwards oblig'd to ſtop the Blood, we

For Excreſcences.

Of which we muſt extirpate as much as we can by the Ligature.

And conſume the Remainder by Cauſticks.

Which muſt be very carefully us'd, for fear they ſhou'd hurt the Membrane of the Paſſage.

make uſe of a little vitriol Stone fix'd to a Quill in the form of a Crayon, ſo that there appears but a ſmall Point of it out to hinder its touching any other Part but that where it is wanted, to ſtop the Blood by making an Eſchar, which alſo takes away part of the *Fungus*, and to conſume the reſt which lies deeper in the Paſſage. As there muſt be a great deal of Caution us'd not to prejudice the Membrane by the Cauſticks, the moſt us'd of which are Powder of Savin, burnt Alum, red Precipitate mix'd up with Wax and Turpentine; I wou'd not chuſe to make uſe of the ſmall thin Pieces of the Wax but I think the Cauſticks may be very ſafely apply'd in the form of an Unguent at the end of a Tent, which may be introduc'd into the Paſſage, after we have plac'd a ſmall leathern *Canula*, like the Finger of a Glove in it, into which we may eaſily puſh the Tent with the Unguent at the end of it, without being afraid of touching the Membrane which lines the Paſſage. Inſtead of Leather, we may make our *Canula* of Copper or Si ver, which muſt be very thin, and curv in the ſame manner as the Paſſage After the Eſchar is made, we mu dreſs it up with ſome Drops of C

of Eggs, or of Oil of ſweet Almonds,
s much to give Eaſe to the Paſſage
s to ſeparate the Eſchar: we muſt repeat
he Application of theſe Medicines till
he *Fungus* is conſum'd, and when it is,
ve muſt make Tents and ſpread them at
he End with *Wourtz* Brown Ointment.
TheſeTents muſt be introduc'd, and puſh'd
eyond the *Canula*, that the Ointment
nay reach the reſt of that ſuperfluous
leſh, which remains in the Surface of
he Paſſage, in which the *Fungus* was,
o hinder it from ſprouting up afreſh,
nd alſo to procure a good Digeſtion.
fter which we muſt make uſe of deter-
ve and anodyne Medicines to incarn and
catriſe the Ulcer; always taking care
o mix with them every now and then,
mething to ſtop the Regeneration of
e *Fungus*. A little Vitriol diſſolv'd in a
fficient Quantity of ſome vulnerary and
eterſive Decoction, to give it a little Aſ-
ingency, is very fit for this purpoſe; we
ay either inject it into the Ear, or paſs
little Lint dipt in this Liquor into it:
e Lint is the beſt Method when it may
eaſily introduc'd, becauſe it preſſes
on the Ulcer, and hinders the *Fungus*
om ſprouting up.

Cure of the Obſtruction proceediug from the Glands being tumefy'd.

In the fifth ſort of Obſtruction, whi
is occaſion'd by Tumefaction of t
Glands of the Paſſage, the ſame gener
Remedies are preſcrib'd, which are uſ
in all other Colds : We fumigate the E
with the Steam of Carduus, or of Deco
tions of Florentine Orris, Sweet Marj
ram, Carduus, Wormwood, Baum, C
lamint, Aniſeeds, Fennel, &c. T
Decoction of Coloquintida in Oil is ver
much eſteem'd. *Barbette* makes uſe of
Decoction of Cloves in red Wine, ſom
of which he drops into the Paſſage, whi
muſt afterwards be ſtopt up with a Clo
We find in *Platerus*, a particular Wat
for this purpoſe, which is ſaid to be ve
efficacious; there is another in *Minder*
rus, which has been reform'd by *Zw*
fer, in his Remarks upon the *Auſbou*
Pharmacopœia, and we have a compou
Spirit of Wine in *Amynſicht*. The Jui
of Sweet Marjoram preſs'd out alone,
very much eſteem'd: And the Urine
a Hare is very much commended by
ſelf, or mix'd with Spirits of Wine, A
Water, and *Hungary* Water ; it is al
a good Method to keep the Ear ſto
with a little Cotton perfum'd with Muſ
There are ſome People in whom t
Membrane which lines the Paſſage, a

t

he *Membrana Tympani* are ſo fine, that
ve cannot inject their Ear with theſe
harp and ſpirituous Liquors ; and then
ve muſt content our ſelves with dropping
ome upon ſome hot Bread,which may be
eld upon the Ear. It is alſo a good Me-
hod to hold theſe Liquors in the Mouth,
ecauſe their ſpirituous Particles become
levated, and paſs thro' the Aqueduct
nto the Ear; and therefore for the ſame
eaſon Maſticatories are us'd with Suc-
eſs.

It is very eaſy to explain the Action
f theſe Medicines, ſince all of them be-
ng of a ſubtile and penetrating Nature,
ey open the Ducts of the Glands, and
ake room for the Evacuation of the
perfluous ſerous Humours. To this I
all add an Obſervation, which was
ommunicated to me by Mr. *Paſſerat*,
very ſkilful Phyſician and Surgeon, of
young Nobleman about eleven or
velve Years old, to whom it frequently
ppen'd in the beginning of the Spring
d Autumn, that the Glands of the Paſ-
ge were ſwell'd in ſuch a manner that
e Parts touch'd one another, and that
was impoſſible to introduce any thing
to it. At firſt they us'd to drop ſome
il of ſweet Almonds into the Ear, to

aſſuage the Pain, afterwards they mad uſe of a Decoction of Barley and Agr mony, which is deterſive and deſiccative and by this means, the Ear after havin diſcharg'd a Moiſture which was almo like *Pus*, recover'd its priſtine State.

The Diſeaſes which the Membrana Tympani *is liable to, are, Relaxation.*

I come now to the Diſeaſes of the *Mem brana Tympani*, which are Relaxatio too great Tenſion, Schirrouſneſs and Rup ture. The Relaxation proceeds fro too great an Humidity, which moiſte the Membrane; this Symptom commo ly accompanies that Obſtruction of th Paſſage, which is produc'd by the ſwe ling of the Glands, which we have a ready deſcrib'd, and contributes in a grea meaſure to the Thickneſs of Hearing, i thoſe People who are ſubject to Fluxio from Catarrhs; and therefore, as Exp rience demonſtrates daily, South Wind Fogs and Rainy Weather diminiſh th Senſe of Hearing.

Too great Tenſion.

The extraordinary Tenſion of th *Membrana Tympani*, produces a qui contrary Effect; ſo that it makes t leaſt Noiſes become inſupportable: th Tenſion happens in violent Pains in t Head, and in acute Fevers, becauſe t Tenſions and Irritations of the Mem bran branes of the Brain are communicated to all the neighbouring Membranes.

Schirrouſneſs.

The Schirrouſneſs of the *Membrana Tympani* proceeds from too great a Dryneſs, as it is viſible in old People; and beſides this, we know by an infinite Number of Obſervations, that the Membranes of the Body may become callous, and even bony: And this is what I have particularly obſerv'd in the *Dura Mater*, and in the Coats of many Arteries, which I have often found oſſified; which may make us imagine that the *Membrana Tympani* may ſometimes grow hard and cartilaginous, and ſo occaſion an incurable Deafneſs.

Rupture.

Laſtly, The *Membrana Tympani* is liable to be ruptur'd either by ſome external Cauſe, as by an Ear-Picker, which we may puſh too far in without thinking of it, or by ſome Strain in ſhutting the Noſtrils and Mouth, and forcing back the retain'd Breath with Violence; which Caſe happen'd to a Perſon of my Acquaintance. This Action of the Air is remarkable in Sneezing, in which we perceive that the Air which paſſes ſuddenly up the Paſſage, forces the *Membrana Tympani* outwards, and ſo cauſes a painful Tenſion. This may alſo happen in Quincys and in Difficulties of Reſpiration, where the *Fundus* of the Mouth and of the Noſe are ſwell'd by any Cold or Inflammation: for the Air which is driven out of the Breaſt not having the Liberty of paſſing out, forces it ſelf into the Paſſage which leads from the Palate to the Ear with ſuch Violence, that it is capable of lacerating the *Membrana Tympani.* *Tulpius* gives us two conſiderable Examples of this in his 35th Obſervation of his firſt Book. It is ſomewhat difficult to explain how the *Membrana Tympani*, which is ſo ſtrongly inſerted into a Groove, does not reſiſt the Impulſes of the Air; nevertheleſs, if we conſider that this Groove is not continued in the whole Circle, but that it ends near the Place which anſwers to the Entrance of the Paſſage, which penetrates into the *Cavernulæ* of the *Proceſſus Mammillaris*, as may be ſeen in *Plate* VII. *Fig.* II. and that at this Place the *Membrana Tympani* is only join'd to the Edge of the bony Paſſage of the Ear; it will readily be conceiv'd, that it may eaſily be forc'd out and disjoin'd at this Place; and by this afford a Paſſage for the external Air to enter in. We may perceive by this how greatly *Tulpius* is deceiv'd, when he imagines

Or at leaſt Diſunion from the Bone to which it was before united.

imagines that the Paſſage which paſſes from the Ear to the Palate contributes not only to the renewing of the Air of the *Tympanum*, but alſo affords a Paſſage to the Air we breathe upon certain Occaſions; which Notion he has pretended to eſtabliſh upon the Obſervation of thoſe two Aſthmatick Perſons, we ſpoke of before, and upon the Opinion of *Alcmæon*, who, from the Account of *Ariſtotle*, imagin'd that there were ſome Goats, who breathe through their Ears. Moreover, the *Membrana Tympani* may be eroded by the Acrimony of the *Pus* which is retain'd in the *Tympanum*, or in the Inſide of the auditory Paſſage; we find many Examples of this in *Fabricius Hildanus*, *Schenkius*, and in many others. In what manner ſoever the *Membrana Tympani* be broke, it happens that in ſhutting the Mouth and the Noſtrils, the Air comes out of that Ear with Noiſe, and with ſuch a Force that it can extinguiſh a Candle. As for the Hearing, it is preſerv'd for ſome time, but it inſenſibly grows weaker, and is entirely loſt at laſt; which demonſtrates, when it is broke, that this *Membrana Tympani* is not abſolutely neceſſary to hear with, and that its principal Uſe is to tranſmit the Vibrations

Theſe Cauſes do not occaſion an entire Privation of the Hearing at firſt: But only ſometime afterwards.

Vibrations to the Air contain'd in the *Tympanum*, and to the ſmall Bones, and to keep off the Injuries of the external Air. The external Air may alone ſuffice to agitate the little Bones, and the immediate Organ, and excite the Senſe of Hearing; but as it deſtroys all the Parts of the internal Ear by its Coldneſs, and its other exceſſive Qualities, it takes away at laſt the Senſe of Hearing.

Cure of the Relaxation.

Of the Tenſion.

The Schirrouſneſs and Rupture are incurable.

In the Relaxation of the *Membrana Tympani*, we muſt uſe the ſame Remedies which are us'd in the Obſtruction proceeding from a Catarrh. In the Tenſion beſides the Remedies proper for the Diſtempers from which it is produc'd, we muſt foment the Ear with Milk, Oil of ſweet Almonds, or with ſome emollient Decoction: The Schirrouſneſs and Rupture of this Membrane are incurable.

The Diſeaſes of the Tympanum, *and of the Labyrinth, are*

Caries of the Bones.

As for the *Tympanum* and the *Labyrinthus*, as they are bony Parts cover'd only with a Membrane, I don't conceive how they can be liable to any other Diſeaſes than to a Caries of the Bone, and to Inflammation of the Membranes. The Caries of the Bone happens ſometimes after thoſe Abſceſſes of the auditory Paſſage which break in the back part of the Ear; and then it hath been remark'd that a

Fiſtula hath been form'd above the *Proceſſus Mammillaris*, which hath penetrated into its *Cavernulæ*, and has caſt off in Scales, the little *Laminæ* which compoſe them. This *Caries* is accompanied with a very offenſive Smell, and with very bad Symptoms, and it eaſily penetrates into the *Tympanum*, by the means of the Paſſage which has already been ſpoken of in the firſt Part, which deſtroying all the therein contain'd Parts, cauſe Deafneſs: But this very ſeldom happens; I have had but one or two Examples of it.

Which may cauſe Deafneſs,

As for the Inflammation of the Membranes, I have often found in diſſecting the Ear, the *Tympanum*, *Veſtibulum*, the Semi-circular Canals, and the *Cochlea* fill'd with thick Matter, which might proceed from ſome Abſceſs of the Membranes which line theſe Parts. I don't doubt but that this may be the Cauſe of Deafneſſes, as well as the Collection of other Humours, which may be form'd in all theſe Cavities: and what renders this Opinion more probable, is the Difficulty there is in the diſcharging this Matter out of the *Tympanum*, becauſe its Cavity is ſituated lower than the Orifice of the Paſſage which goes from the Ear to the Palate; and therefore theſe

Inflammation of the Membranes,

And Abſceſs of the Membranes.

Liquids can't fall into the Mouth without we bend down the Head in a particular manner: And before they can be diſcharg'd through the auditory Paſſage, they muſt firſt lacerate the *Membrana Tympani*, which they cannot do except they are very acrimonious. We may alſo ſuſpect that the *Lamina Spiralis* may be eroded by the Acrimony of the Matter, and that it may even become too lax or too callous, much in the ſame manner as the *Membrana Tympani*, which I don't poſitively aſſert, never having had an Example of it.

Inflammation of the Lamina Spiralis.

Which may grow carious.

Cure of the Caries.

I can't recommend better Remedies in treating of the *Caries* of the Bone which happens in the Ear, than thoſe which have been deſcribed by Monſieur *Deymier*, a very ſkilful Surgeon, from whom I had this Remark: At firſt he dilated the Entrance with a prepar'd Sponge, which made a pretty conſiderable Opening, ſo that he cou'd apply his Medicines upon the carious Bones; after that, he made uſe of Lint dipt in the imperial Water, in which he had diſſolv'd a little Camphire; but as this incarn'd the Sides of the Ulcer too ſoon, and the *Caries* remain'd ſtill, he had recourſe to *Eu-*

phorbium in Powder, which he made uſe of with good ſucceſs; this produc'd ſome little ſmarting but light Pains, which did not laſt long. The Uſe of this Powder produc'd the deſir'd Effect, that is to ſay, the Exfoliation of the Bone, in hindering the *Fungus* from ſprouting up. He made uſe alſo of *Euphorbium* in a Tincture with Spirits of Wine, to which he added ſome Myrrh and Aloes. The *Caries* being thus conſum'd, and the Bone exfoliated, he return'd to the Uſe of the imperial Water, till he made a perfect and entire Cure of it; and over the Lint he apply'd the Plaiſter of *Janua*, to which he added the Eſſence of Juniper and of Cloves, and a little Oil of Marigolds.

Cure of the Inflammation of the Membranes.

In the Inflammation of the *Tympanum*, and of the *Labyrinth*, topical Remedies are almoſt of no effect; in this Caſe we muſt keep to the internal and general Remedies, which alſo have no better Succeſs, becauſe the Abſceſſes break out in the Inſide of the *Tympanum*, and of the Cavities of the *Labyrinth*, from whence the Matter can't poſſibly be diſcharg'd: ſo that theſe Humours being collected together in theſe Cavities, occaſion an incurable Deafneſs.

The Diſeaſes of the auditory Nerve.

The Diſeaſes of the auditory Nerve are Obſtructions and Preſſure, when the whole Brain is overflow'd by ſerous Humours in an Apoplexy, and in any Palſy, it is evident that the Nerve will be obſtructed in the ſame manner as the others are. Beſides this, we may eaſily conceive that the Obſtruction of the Nerve alone, without any other Fault in the Organ of Hearing, may occaſion a Deafneſs, in the ſame manner as the Obſtruction of the optic Nerve produces a *Gutta Serena.* A Preſſure upon the Nerve produces the ſame Effect; it proceeds from many Cauſes, as from the Blood and from other extravaſated Fluids, as we find in the greateſt Number of Apoplexies, or from any Tumour. I find an Example of this laſt Caſe in Monſieur *Bonnet*, a celebrated Phyſician of *Geneva*, in his firſt Book of practical Anatomy, the 53d Obſervation of the ſecond Section; which relates, that Mr. *Drelincourt* found in the Brain of a Man that had dy'd of an Apoplexy, a *Steatoma* between the *Cerebrum* and *Cerebellum*, which at firſt caus'd a Blindneſs, afterwards a Deafneſs, and laſtly, an entire Privation of all the animal Faculties.

Obſtruction,

And Preſſure,

Which may proceed from Tumours happening upon the Brain.

It is difficult to know whether the Deafneſs proceeds from any Fault in the Nerve, or from any Defect in the Organ.

It is eaſy to know this Obſtruction, or this Preſſure upon the Nerve, in the Eye where all the Parts are tranſparent and diaphanous; for when there is no Fault to be perceiv'd in theſe Parts, we have reaſon to ſuſpect ſome Obſtruction of the optic Nerve; but in the Ear all the internal Parts are hid from our Sight, ſo that we can ſcarcely judge whether the Fault is in the Organ, or in the Nerve. Neverthleſs, if any Stupor or Palſy has preceded this Deafneſs, or elſe if there is any other Senſe taken away at the ſame time, we may reaſonably ſuſpect that the Brain is affected, and the Nerve alſo, by Obſtruction or by Preſſure. In this Caſe, we muſt preſcribe the ſame Remedies which are us'd in Palſies, frequent Purges, Emetics, cephalic Waters and Spirits, Sudorifics, Baths, Maſticatories, and Sternutatories, *&c.* The Preſſure which is caus'd by ſome Tumour is incurable.

The Noiſe in the Ear is a Symptom, the Cauſes of which are difficult to explain.

The Diſeaſes which have been explain'd hitherto, take away quite or diminiſh the Senſe of Hearing; but the Noiſe in the Ear is a Depravation of it; this Depravation conſiſts in rendering the Ear ſenſible of Noiſes which are not in reality, or which are not external; ſo that it being already attentive to one Sound, it is leſs capable of receiving the Impreſſions of external Sounds, except they are extremely violent.

The Ancients attributed it to the implanted Air.

The Ancients imagin'd that the true Reaſon of the Symptom conſiſted in the Motion and Agitation of the implanted Air in the Ear. They related that this Agitation was commonly caus'd by Winds and Vapours which came into the Ear from all the whole Body, as it happens in ſome Fevers, or from ſome Part of it, as from the Stomach or the Brain; or that it proceeded from ſome pituitous Fluid inclos'd in the Cavities of the Ear; they wou'd alſo have explain'd all the different Sorts of Noiſes in the Ear by the Quality, the Conſiſtence, and the Motion of the Fluids, or Air, which are collected in the Inſide of the Organs of Hearing. I ſhall not ſtop here to take notice of all that may be defective in this Explanation, one may judge pretty well of it by the Idea that I ſhall give of this Noiſe in the Ear; I ſhall content my ſelf with ſaying, that there is no Appearance that theſe different Sounds, which they imagine we hear, are caus'd by any thing which in reality ſtrikes upon the Ear, to produce the Sounds of Bells, murmurings of Waters, and an infinite Number of other Sounds, which Perſons ſubject to theſe Noiſes in the Ear are every day ſenſible of, and that it is credible, that the moſt part of theſe Buzzings in the Ear are but falſe Sounds, and that theſe Appearances of Noiſe may be produc'd without any Wind being in the Ear, or without Matter which ſtrikes the Membranes externally, which compoſe the immediate Organ of Hearing, as I am going to explain it.

It is more reaſonable to believe that it is commonly produc'd by the Vibration of the immediate Organ.

It is my opinion, that the Noiſe in the Ear, conſiſts in the Perception of a Sound which is not in reality, or of an internal Sound. To explain how we can be ſenſible of a Sound which is not in reality, we muſt take notice that the Action of Hearing conſiſting in a Vibration of the immediate Organ, it is ſufficient that this Vibration be excited to cauſe a Sound, without it's being neceſſary that this Motion be produc'd by the Air; for in the ſame manner that we conceive, how Viſion, which depends on the manner in which the *Retina* is agitated by the viſual Rays, may be perform'd without theſe Rays, when this Agitation is produc'd from any other Cauſe, as it happens when the Eyes ſee Sparks of Light in the dark, after having

Which is produc'd by Cauſes enclos'd in the Membranes of the Organ.

ing receiv'd a Blow: we may alſo ſay, that when any other Cauſe than the agitated Air produces in the Organ of Hearing, I mean the Inſide of the Subſtance of the Membranes, this Agitation, which is regulated in the ſame manner, that it commonly is by the Air which brings the Sound; the Ear ſeems to be ſtruck by a Sound which in reality is no more than the Light of the before-mention'd Sparks is a true Light. But what renders this Compariſon pretty juſt, is, that as theſe falſe Appearances of Light, which are not caus'd by external Objects, have nothing in them diſtinct and particular, but only a ſimple Light; the Sight of a more complex Object, requiring the Concurrence of too many Things: So it ſcarce ever happens, that the Noiſes in the Ear which we are treating of, have any Sound but what is confus'd; the Whiſtling and Tinklings which are the moſt diſtinct Noiſes in this Symptom, being but meer Sounds.

Which may be attributed to the Diſeaſes which produce this Symptom.

For to determine what can be the Cauſe of this Agitation in the immediate Organ, we muſt examine the Diſtempers in which theſe Noiſes are found; theſe Diſtempers are Inflammations and Abſceſſes in the *Tympanum* and *Labyrinth*,

rinth, and the Diſeaſes of the auditory Paſſage. Inflammation and Abſceſſes in the *Tympanum*, and in the *Labyrinth*, neceſſarily cauſe Vibrations in the *Lamina Spiralis*, and in the Semi-circular Canals, either by the Tenſion of the Membranes, or by the Vapours which perſpire, and are mix'd with the Air in the *Tympanum*. Sharp Humours, Worms, extraneous Bodies, the Contraction of the Paſſage which ſucceeds the Swelling of the Glands, and in general every thing that cauſes Pain, and the other Symptoms in the auditory Paſſage, which I have before deſcribed, agitate the Membrane of the Paſſage, and the *Membrana Tympani*, which is ſufficient to communicate this Agitation to the immediate Organ.

Sometimes the Noiſe in the Ear proceeds from an external Impulſe; As when we ſtop our Ears with our Hands.

The ſecond ſort of Noiſe in the Ear is that in which we perceive a true, but an internal Sound. It is thus, we perceive a Buzzing when we ſtop our Ears; this Noiſe is caus'd by the Friction of the Hand, or by the Preſſure which rumples the Skin and the Cartilages, whoſe Particles may occaſion Agitations in this Place; the Elaſticity of the inclos'd Air, and the Vapours which inceſſantly proceed from Bodies, may alſo contribute to them, when thoſe Vapours which proceed from the Hand, join'd with thoſe which come from the Membrane of the Paſſage, being confin'd, ſtrike upon the *Parietes* of the Cavity, and produce Vibrations; which though they are very ſmall, yet they form a true Sound, which becomes ſenſible from the Proximity and Continuity of the Parts, and alſo by the help of the Reflections which are form'd in this incloſ'd Cavity.

The Diſeaſes which cauſe this ſort of Noiſe in the Ears, are, The Commotions of the Cranium.

The Commotions of the *Cranium*, and the Diſtempers which contract the Paſſage, may cauſe ſuch ſort of Noiſes in the Ear, if we ſuppoſe that the Shocks the whole *Cranium* receives, are communicated to the immediate Organ only by the Continuity of the *Os Temporale*; I mean, at the very Time of the Commotion: for as for thoſe which afterwards ſucceed, they muſt be attributed to the Diſorder of the Spirits, as we ſhall ſee in the Sequel. In the ſame manner, the ſwelling of the Membrane of the Paſſage may, in contracting it ſelf, produce a like Effect. Beſides this, it often happens that we perceive a Pulſation in the Inſide of the Ear, which makes us believe that we hear ſomething beat, and this Pulſation is ſometimes ſo ſtrong, that other People

The beating which we imagine we hear in the Inſide of the Ear is caus'd by The Contraction of the auditory Paſſage.

People may hear it. I have made an Obſervation upon this, of a Lady of *Picardy*, who upon the leaſt violent Exerciſe perceiv'd ſo troubleſome a Pulſation, that it ſeem'd to her that ſhe had a *Pendulum* fix'd to her Head, and this Pulſation was alſo heard by thoſe who came near her. Now this beating is nothing elſe but that of a dilated Artery, becauſe it always perfectly agrees with the beating of the Heart; and this Perception of an internal Sound, appears to me abſolutely like that Symptom which is obſerv'd in imperfect Suffuſions. Thoſe Perſons who are ſeiz'd with this Diſorder, ſee Motes and Flies flying before the Objects; theſe Motes and Flies are nothing elſe but the viſcous and groſs Particles which begin to be amaſs'd in the aqueous Humour, which by their Motion agitate the *Retina*, and neceſſarily produce a Senſation. But, ſay they, if theſe are true Noiſes, and if the Organ diſtinguiſhes them ſuch as they are, why are they put in the Number of tinkling Noiſes in the Ear? I anſwer, that in reality theſe Noiſes are perceiv'd ſuch as they are, but that the Hearing is deprav'd in miſtaking theſe Noiſes as coming from ſome external Object, in the ſame manner that thoſe who have a Cataract beginning to be form'd, imagine theſe

And by the Pulſation of a dilated Artery.

theſe Appearances of Motes and Flies to be exernal Objects, and put out their Hands to catch him.

The immediate Vibration of the Extremities of the nervous Fibres, to their Origin in the Brain, may cauſe all the Appearances of Noiſes.

Beſides this, I imagine there may be a Perception of a falſe Noiſe without any Defect in the Organs of Hearing: Which happens every time that the Parts of the Brain, where the Filaments of the auditory Nerve terminate, are mov'd and agitated in the ſame manner that they us'd to be vibrated by Objects. What induces me to believe this, is, that I take notice of a great Number of Diſeaſes of the Brain which are accompanied with a Noiſe in the Ear: As for example, Deliriouſneſs, Phrenzy, Vertigoes, and thoſe Perſons which fall into Epilepſies and Swoonings, perceive theſe buzzing Noiſes in their Ears, which are as the Præcurſors of Paroxyſms. As there is an irregular and extraordinary Motion of the Spirits in all theſe Diſtempers, it is much eaſier to imagine that the agitated Spirits may ſtrike upon the Extremities of the auditory Nerve, and ſo by this means cauſe a Senſation of Noiſe, than to imagine that there is a Defect in the Organs of Hearing. This manner of explaining the Noiſe in the Ear, appears to me reaſonable enough; and methinks we may add, that as the Motion of the Spirits is very irregular and diſorder'd in all theſe Diſtempers, ſo the Sounds and Noiſes in the Ear muſt in this Caſe be very confus'd and very different from the Sounds which we commonly hear. I ſhall without doubt be told, that this is a falſe Imagination, and not a Symptom of the Ear. I agree to it, and this is what I alledge: As it is thought that we can never hear without the Ear is ſtruck upon, we attribute all Noiſes to this Organ; nevertheleſs it is indifferent whether the Fibres of the Nerves be ſhaken next the Ear, or next the Brain, there will ſtill ariſe the ſame Senſation from it: and this is caus'd in the ſame manner as in the Vertigo, in which we know that the circular Motion of Spirits alone produces the ſame Effect as if the viſible Objects had really this rotatory Motion; or in frantick Perſons, who fancy they ſee Motes which are not in reality, which is caus'd only by the Agitation of the Fibres of the optic Nerve in the Inſide of the Brain. As they alſo attribute the Symptoms of Suffuſions and Phrenzy to a deprav'd Imagination, we muſt attribute the Noiſes in the Ear, which ſucceed the Diſtempers of the Ear, to the ſame Cauſe, although they very often don't

Which are not ſo much a Symptom of the Diſeaſes of the Ear.

don't in any manner depend on the Indiſpoſitions of the Organ of Hearing.

As of thoſe of the Brain, which produce a ſecond ſort of Noiſe in the Ear.

We may after this manner lay down two Sorts of Noiſes in the Ear, one of which proceeds from the Diſorders of the Brain, the other from the Diſorders of the Ear; thoſe which ſucceed the Diſorders of the Ear are, as aforeſaid, either true or falſe; and of theſe ſome are call'd Tinklings in the Ear, others Whiſtlings, others Buzzings, others Murmurings, &c. And in general we may ſay, that the hollow and buzzing Noiſes are produc'd by a ſlow Vibration, and the Whiſtlings and Tinklings by a cloſe and ſtrict Vibration, which is confirm'd by the remote Cauſes of theſe Symptoms: Colds, for example, and Suppurations, in which the Membranes are relax'd, commonly produce a Buzzing; and Inflammations and Pains in the Ear, in which theſe Parts are commonly tenſe and dry, Whiſtlings and Tinklings. We muſt alſo believe, that all theſe Noiſes make the ſame Impreſſion upon the *Lamina Spiralis*, and upon the Semi-circular Canals, as grave and acute Sounds.

The Cure of the Noiſe in the Ear generally depends upon the Diſeaſes of the

Brain, or of the Ear which produce it. To this I add, that in the Whiſtlings and Tinklings we muſt make uſe of very nigh the ſame Remedies, as thoſe which have been deſcrib'd in ſpeaking of the Pain proceeding from Heat, and of the Tenſion of the *Membrana Tympani*; and that in the Buzzings we may make uſe of thoſe which have been preſcrib'd for the Pain which is occaſion'd by Cold, and for an Obſtruction proceeding from a Catarrh. After which, it will be no difficult matter to chuſe the moſt convenient, if we conſider the Circumſtances which may afford us the neceſſary Indications for the Cure.

The Cure of the Noiſes in the Ear, is the ſame as that which is us'd for the Diseaſes from which they are produc'd.

FINIS.

A GENERAL TABLE OF The Organ of Hearing.

PART the Firſt, containing the Structure of the Organ of Hearing.

T*HE external Part of the Organ of Hearing call'd only the Ear,* Page 1. *is compos'd of a Cartilage,* 2. *of Skin, of Fat, of a nervous Membrane, of two Muſcles,* id. *of Arteries,* 4. *of Veins,* 5. *and of Nerves,* 6.

The Hole of the Ear is divided into two Parts, 1ſt. *The cartilaginous Part, which is broke off in many Places,* id. *and cover'd with a Skin, adorn'd with many little Glands,* 8. *and is connected to the* Os Temporum *by a Ligament,* id. 2dly, *the bony Part,* 10.

The cartilaginous and bony Part form the auditory Paſſage, id.

The external Part of the Organ of Hearing is ſeparated from the internal, by the Membrana Tympani, id.

The firſt Cavity of the internal Ear call'd the Tympanum *or* Drum, 16. *has five remarkable Things in it*, 1*ſt*. *Two Paſſages, one of which paſſes into the Palate*, 18. *the other into the* Cavernulæ *of the* Proceſſus Mammillaris, 22. 2*dly*. *Two* Apertures *or* Feneſtræ, id. 3*dly*. *Four little Bones, the* Malleus, 25. *the* Incus, 26. *the* Stapes, 27. *the fourth little Bone*, 28. 4*thly*. *Three Muſcles, two of which belong to the* Malleus, viz. *the External*, 29. *and the internal Muſcle*, 30. *and one to the* Stapes, ib. 5*thly*. *A Branch of a Nerve*, 31.

The ſecond Cavity of the internal Ear call'd the Labyrinth, is divided into three Parts, id. 1*ſt*. *The* Veſtibulum *which has nine* Foramina, 32. 2*dly*, *The three* Canales ſemi-circulares, viz. Canalis ſemi-circularis Superior, 33. Inferior, id. Medius, id. 3*dly*, *The* Cochlea, *in which two Things are to be taken notice of*, viz. 39. 1*ſt*, *The ſemi-oval Canal*, id. 2*dly*, *The* Lamina Spiralis, id. *Which is fix'd to the Canal by* *by a very fine Membrane*, 40. *and which divides the Canal into two*, id. *and 3dly, The Arteries and Veins of the* Cochlea, 41. *and of the* Veſtibulum, id. 4*thly. The implanted Air*, 42.

The other Parts of the Organ of Hearing, are the Canal of the auditory Nerve, id. *The* Nervus Auditorius *is divided into two Branches*, viz. *The* Portio Mollis, 43. *which is divided into three Branches, the largeſt of which is diſtributed into the Axis of the* Cochlea, id. *The two other Branches into the* Veſtibulum, *and into the ſemi-circular Canals*, 49. *the* Portio Dura, 50. *which produces as it paſſes out of the Cranium, a Ramification which is expanded over the back part of the Ear*, 51.

The Chorda Tympani *is a Nerve which is a Branch of the fifth Pair*, 53. *which is join'd to the Trunk of the* Portio Dura, id.

The ſecond vertebral Pair furniſhes a Branch to the Ear, 55.

There are many particular Things in the Ear of a Fœtus, 57. 1*ſt. That part of the auditory Paſſage which is bony in Adults, is nothing but a Membrane in the* Fœtus, id. 2*dly, There is a Circle which is not entire*, 59. *it is hollow in the Inſide like a Gutter*, 60. *This Cir-*

cle is united to the bony Canal in Adults, id. *it has the ſame Plan in the* Fœtus *as in the Adult*, 61. *3dly, The Aqueduct is almoſt entirely membranous*, id. *4thly, The* Membrana Tympani *is cover'd with a mucilaginous Matter*, id. *5thly, The ſuperior Semi-circular Canal, and a Portion of the Inferior, are viſible without any Diſſection*, id. *6thly, There is a* Foſſa *and* Foramen *in the* Os Petroſum, 62. *7thly, The ſcaly Part of the temporal Bone is ſeparable from the* Proceſſus Mammillaris, *which is very minute*, id. *8thly, The* Oſſiculæ *and the Labyrinth are pretty nigh the ſame ſize in the Adult, and in the* Fœtus, id.

The Trunk of the Portio Dura *has two principal Branches, which are divided into many Ramifications*, 63. *The Ramifications of the firſt Branch are diſtributed to the Muſcles of the Forehead, Temples and Eyelids, and paſs into the Orbit*, id. *They alſo go to the Muſcles of the Noſe and Lips*, id. *And to all the Integuments of the Face*, 64.

The Ramifications of the ſecond Branch are diſtributed to the Muſcles which are under the Jaw, id.

The fifth Pair furniſhes a Branch to the Portio Dura, 65.

OF

OF

The Organ of Hearing.

PART the Second, containing the Uſe of the Parts of the Ear.

THE mechanical Structure of the Organs of Hearing, ſerve to diſcover the Uſe of them, Page 67.

The external Ear performs the Office of the Trumpet, which deaf People make uſe of, 68. *Its Folds ſerve to augment the Force of the Air, which acts upon the Organs by the Refractions which they cauſe,* 69.

The Muſcles of the external Ear ſerve to contract and dilate it, id.

The Obliquity of the Paſſage is proper to preſerve the Membrana Tympani *from the Injuries of the Weather, and to render the Vibrations ſtronger by doubling its Refractions,* id.

The Wax ſtops extraneous Bodies, which might impair the Membrana Tympani, 70. *it may alſo be prejudicial to the Ear,*

when it is too thick and in too great quantity, id.

The Membrana Tympani *is neceſſary for the Preſervation of the other Organs*, 71. *It is extended by the Muſcles of the* Malleus, 72. *The Will is not the Cauſe of theſe Muſcles acting, but the different Diſpoſitions of the Objects*, 73. *and according to the Occaſions which concur*, 74. *The* Membrana Tympani *is more or leſs relax'd according to the Diverſity of Sounds*, id. *Which it does in putting on their Characters, by mechanical Motions which are difficult to explain*, 75.

The Agitation of the Membrana Tympani *is communicated to the other Organs of Hearing, not ſo much by the Help of the Air, which is in the Cavities of the Ear*, id. *as by the Aſſiſtance of the little Bones, which agitate the Labyrinth, and the Air which is incloſ'd in it*, 76.

The Muſcle of the Stapes *ſerves to extend the Membrane, which is fix'd to its* Baſis, 77. *and to extend the* Stapes *it ſelf*, id.

The Paſſage of the Proceſſus Mammillaris *affords a Paſſage to the Air when it is over-preſs'd in the* Tympanum, 78.

The Aqueduct ſerves to bring the Air from without to it, and to renew that which

is in the Tympanum, id. *and not to ſupply the Office of the* Membrana Tympani, 79.

The Feneſtra Ovalis *communicates the Vibrations of the Air to the Labyrinth*, 80.

The Feneſtra Rotunda *communicates them to the* Scala Inferior *of the* Cochlea, 81.

The immediate Organ of Hearing conſiſts of two Parts, which compoſe the Labyrinth, id. *the firſt of which is the* Cochlea, id.

The Lamina Spiralis *is eaſily vibrated*, id. *1ſt. Becauſe of its Subſtance*, id. *2dly. Becauſe it is very much extended*, 82. *3dly. Becauſe in dividing the Semi-oval Canal into two* Scalæ, *it receives Pulſations from the upper and the under one*, id. *4thly. Becauſe its ſpiral Figure is the Cauſe of its being vibrated in many Places*, 83. *5thly. This* Lamina *receives all the different Vibrations of the Air, becauſe of its unequal Figure*, id.

The ſecond Part of the immediate Organ comprehends the Veſtibulum *and the three Semi-circular Canals*, 84.

The Cochlea *is not to be found either in Birds or in Fiſhes, the Semi-circular Canals alone perform the Office of the immediate Organ in theſe Animals*, 85. *There are Nerves and Membranes which are*

are the Cauſe of theſe Semi-circular Canals, forming part of the immediate Organ, id. *Their Windings ſerve to augment the force of the Air, by the Refractions which they cauſe,* id. *Theſe Canals receive the different Characters of Tones as well as the* Lamina Spiralis, 86. *becauſe they are made like Trumpets,* 87. *and their Subſtance is eaſily vibrated,* id.

It is by the Communication of the auditory Nerves with thoſe of the Voice, that the Sympathy between the Voice and the Hearing is caus'd, 88. *and by the Communication of the ſecond vertebral Pair, that the Affinity that there is between the Tones of Hearing and the Motions of the Body are produc'd,* 89. *and that of the Pulſe,* id.

OF

The Organ of Hearing.

PART the Third, containing the Diſorders of the Organ of Hearing.

THE Knowledge of the Diſtempers of the Ear depends upon that of its Parts, which are affected, Page 90.
The Diſorders of the auditory Paſſage which cauſe extreme Pain, and remain in this Part, proceed from, 91. *the Solution of Continuity,* 92. *caus'd by the Wax, which is in the Inſide of the auditory Paſſage,* 93. *The external Cold increaſes the Acrimony of it by the Obſtruction of the excretory Ducts of the Glands,* id. *which render the ſaline Juices more pungent,* 94. *by Heat, which looſens and diſſolves theſe ſaline Juices,* id. *or by the ſharp, ſaline and ſerous Humours, which ſometimes come out of the Glands of the Ear,* id.

The different Solutions of Continuity cauſe the different Senſations, 95. *of pungent Pain*, id. *of Eroſion*, id. *of Tenſion, of Weight, of Pulſation*, id.

This Pain is very violent, 96. *becauſe the Membrane of the Paſſage is compos'd of a fine nervous Texture*, id. *and receives a great number of Nerves*, id. *and is fix'd cloſe upon the Bone*, id. *and connected with other very ſenſible Membranes*, 97. *And this often cauſes an acute Fever*, 98. *by the Agitation of the Spirits*, id. *and by the Fermentation of the Blood*, 99. *A Watchfulneſs*, id. *Delirium*, 100. *Convulſions*, id. *and Swooning*, id. *A Hiſtory upon this Subject*, 101. *Remarks upon this Hiſtory*, 102.

Remedies to be us'd for the Pain caus'd by Cold, 104. *for the Pain proceeding from Heat*, 105. *for the Pain caus'd by ſerous Humours*, 106.

The Cauſes which produce an Inflammation in the auditory Paſſage are, id. *the Obſtruction of the Glands*, 107. *the Acrimony of the Wax*, id. *which cauſe Abſceſſes and Ulcers, which are difficult to cure*, id. *We ſometimes meet with Worms in the Paſſage*, 108.

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The Cauſes of the Suppuration and the Flux of Blood, which apparently does not come from the Brain, 109.

Cure of the Inflammation, 112. *Abſceſs,* id. *Ulcer,* id. *Worms,* 113. *and Fluxes of ſerous Humours,* 114.

The third Diſorder of the auditory Paſſage is Obſtruction, it is occaſion'd by, id. *extraneous Bodies,* id. 2*dly. The retain'd Wax,* 115. *which petrifies ſometimes,* id. *and cauſes a ſort of Deafneſs eaſy to cure,* 116. 3*dly. By a Membrane,* id. 4*thly. By fleſhy Excreſcences,* 117. 5*thly. By the Glands which ſurrouud it becoming tumified, which is commonly accompanied with a Relaxation of the* Membrana Tympani, id.

Cure of the Obſtruction caus'd by extraneous Bodies, and the Extraction of them, 118. *which is perform'd by the Scoop, or the* Terebra, *when they are inclos'd in the cartilaginous Paſſage,* id. *or when they are contain'd in the bony Paſſage, it is effected by an Inciſion into the back part of the Ear,* 119. *From whence we extract Shot with the* Tenebra, id. *and Fruit-Stones with* Hildanus *his Scoop,* id.

Cure for the Obſtruction proceeding from the Hardneſs of the Wax, 120. *For the Membrane which ſtops up the Paſſage*, id. *for Excreſcences, of which we muſt extirpate as much as we can by the Ligature*, 121. *and conſume the Remainder by Cauſticks*, id. *which muſt be very carefully us'd, for fear they ſhou'd hurt the Membrane of the Paſſage*, 122.

Cure of the Obſtruction proceeding from the Glands being tumified, 124.

The Diſeaſes which the Membrana Tympani *is liable to, are Relaxation*, 126. *too great Tenſion*, id. *Schirrouſneſs*, 127. *and Rupture*, id. *or at leaſt diſunion from the Bone, to which it was before united*, 128.

Theſe Cauſes do not occaſion an entire Privation of the Hearing at firſt, but only ſome time afterwards, 129.

Cure of the Relaxation, 130. *and of the Tenſion*, id. *the Schirrouſneſs and Rupture are incurable*, id.

The Diſeaſes of the Tympanum *and of the Labyrinth, are* Caries *of the Bone*, id. *which may cauſe Deafneſs*, 131. *Inflammation of the Membranes*, id. *and Abſceſs of the Membranes*, id. *Inflammation*

flammation of the Lamina Spiralis, *which may grow carious,* 132.

Cure of the Caries, id.

Cure of the Inflammation of the Membranes, 133.

The Diſeaſes of the auditory Nerve are Obſtruction and Preſſure, 134. *which may proceed from Tumours happening upon the Brain,* id.

It is difficult to know whether the Deafneſs proceeds from any Fault in the Nerve, or from any Fault in the Organ, 135.

The Noiſe in the Ear is a Symptom, the Cauſes of which are difficult to explain, id. *the Ancients attributed it to the implanted Air,* 136. *It is more reaſonable to believe, that it is commonly produc'd by the Vibration of the immediate Organ,* 137. *which is produc'd by Cauſes inclos'd in the Membranes of the Ear,* 138. *which may be attributed to the Diſeaſes which produce this Symptom,* id.

Sometimes the Noiſe in the Ear proceeds from an external Impulſe, as when we ſtop our Ears with our Hands, 139.

The Diſorders which cauſe this ſort of Noiſe in the Ear, are the Commotions of the Cranium, 140.

The Beating which we imagine we hear in the Inſide of the Ear, is cauſ'd by the Contraction of the auditory Paſſage, id. *and by the Pulſation of a dilated Artery,* 141. *The immediate Vibration of the Extremities of the nervous Fibres to their Origin in the Brain, may cauſe all the Appearances of Noiſe,* 142. *which is not ſo much a Symptom of the Diſeaſes of the Ear,* 143. *as of thoſe of the Brain which produce a ſecond ſort of Noiſe in the Ear,* 144.

The Cure of the Noiſes of the Ear, is the ſame as that which is uſ'd for the Diſeaſes from which they are produc'd, 145.